Exploring chronotype, conscientiousness, workplace flexibility and work overload within the Job Demands–Resources Model

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Tanya Meyer

Supervisor: Mrs Michèle Boonzaier

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DECLARATION

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ABSTRACT

For modern organisations to survive and thrive in the economy, they need to obtain a competitive advantage. This can be achieved through various streams, such as better delivery of products and services that are also quick and efficient, together with better pricing and more flexible options. In order to achieve these goals, employees will have to be managed differently, as the manner in which they are managed will have a direct effect on their efficiency, productivity and general well-being, which in turn will influence whether these goals are being met.

Two important well-being measures among employees are burnout and work engagement, which have a direct effect on the achievement of a competitive advantage by an organisation. Employee engagement is a known component of the attainment of a competitive advantage by organisations, while employees are the only component in this attainment that cannot be replicated or duplicated, therefore making people and their engagement the centre of the achievement of a competitive advantage. While employee engagement aids the achievement of a competitive advantage, a burned-out workforce leads to several negative consequences on an individual, organisational and social level that hamper the organisation's ability to achieve such an advantage. While burnout was originally popularised as a condition that only affects employees in the helping professions, it has now become widely known that individuals from all occupational groups can be affected by burnout. Employees who hold tremendous value to the attainment of a competitive advantage and are known to work autonomously, namely the knowledge workers, are also experiencing burnout. Knowledge workers experience high levels of emotional and mental stress due to constant demands for creativity, innovation and superior problem-solving.

The present study therefore aimed to answer the following research-initiating question: Why does variance exist in the work engagement and burnout levels of knowledge workers? To answer this question, a thorough analysis of the literature was done to determine the factors that could account for this variance in the work engagement and burnout levels of knowledge workers. Following the literature review, a conceptual model is proposed based on the job-demands resources theory, with work overload as a job demand, workplace flexibility as a job resource, conscientiousness as a personal resource and chronotype as a special variable. The model was tested using an ex post facto correlational research design. The snowball and convenience sampling methods were used to collect data through online questionnaires. The Morningness-Eveningness Questionnaire (MEQ) was used to assess chronotype, work engagement was assessed using the Utrecht Work Engagement Scale (UWES-17), the Oldenburg Burnout Inventory (OLBI) was used to test the

burnout construct, conscientiousness was assessed using the Big Five Inventory (BFI), work overload was assessed using the Job Demands-Resources Scale (JDRS) and, finally, workplace flexibility was assessed with only two items from the recent literature. The final sample comprised 218 responses and statistical analysis were done to provide the findings for the current study.

Various statistical analyses were conducted, the first to determine whether the construct was reliable and valid. Item analysis indicated good internal consistency, followed by a confirmatory factor analysis (CFA), which indicated that further investigation needed to be done. An exploratory factor analysis (EFA) was therefore conducted to determine the factor structure that best represents the data. A decision was made to retain the two-factor structure for burnout and the three-factor structure of work engagement. The univariate factor structure of workplace flexibility was supported, while conscientiousness and work overload, two univariate structures that originally were found to be two-factor structures, were maintained for the analysis. Work overload was split based on items indicating mental load and emotional load, while conscientiousness seems to be split based on positive and negative items. An additional CFA was done after the new factor structures of work overload and conscientiousness were determined, and the model displayed improved fit.

The final analysis done was PLS-SEM to determine the path coefficients. The majority of the main path coefficients were found to be statistically significant. Three of the eight main hypotheses were found to be statistically insignificant. Of the three hypothesised moderating effects, two were found to be insignificant, while the moderating effect of work overload on the relationship between workplace flexibility and work engagement was found to tend towards significance.

The study contributes to the body of literature on knowledge workers in South Africa by broadening knowledge regarding these workers. Furthermore, this study has several practical implications for recruiting knowledge workers and burnout interventions and provides insights and recommendations for future research.

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CHAPTER 1

INTRODUCTION

1.1 Introduction

According to Johnson (2004), organisations need to be leaner and do business more efficiently to be competitive and last within the economy. Products and services should be delivered and given to the consumer faster, timeously and error-free, while remaining reasonably priced and flexible. To attain this goal, a different manner of managing employees needs to be achieved, as their efficiency, productivity and general well-being greatly determines how well this goal will be met.

Johnson (2004) highlights a development in Psychology in which attention was turned away from studying mental illness towards studying mental wellness (Bakker et al., 2008). This movement is referred to as Positive Psychology and was initiated by Martin Seligman, who at the time of this field's inception was president of the American Psychological Association (Linley et al., 2006). This change also led to a positive change in the field of occupational health psychology (Bakker et al., 2008) by focusing on the positive aspects of work to lead to greater understand of its meaning and effects (Turner et al., 2002). One of the topics investigated in positive organisational psychology research is work engagement (Bakker et al., 2008).

According to Anitha (2014), employee engagement is a dimension of employee functioning that can be utilised by organisations in their pursuit of competitive advantage. The people factor is the most treasured strength of an organisation if dealt with correctly, as it is the only component that cannot be replicated or duplicated by competitors (Anitha, 2014). Organisations in the modern age require employees to be proactive, take initiative, be responsible for their growth and development, demonstrate high levels of commitment and provide quality performance. Consequently, organisations require employees who are characterised as being dedicated, energetic and fully absorbed by their work – also known as engaged employees (Bakker et al., 2008). For organisations, having a workforce that is engaged has been linked to high levels of creativity, innovation, organisational citizenship behaviour, task performance and client satisfaction (Bakker, 2017; Bakker et al., 2014, as cited in Bakker & Albrecht, 2018). Having engaged employees makes a true difference in the human capital of an organisation and can provide organisations with the competitive edge that they require (Bakker et al., 2008). Since work engagement potentially could provide organisations with a competitive advantage, having a work-engaged workforce is a highly

desirable condition for both public and private organisations (Bakker et al., 2014, as cited in Bakker & Albrecht, 2018).

Another influence on employee well-being that needs to be addressed to achieve and sustain a competitive advantage is that of burnout. Job burnout, or simply burnout, is a psychological syndrome that involves stressors that are both chronically emotional and interpersonal in nature and are experienced by employees while working, and the responses that follow as a result of tasks for work, the organisation, colleagues at the office, clients and also themselves (Maslach, 2003, as cited in Swider & Zimmermann, 2010; Maslach & Leiter, 2008).

The occurrence of burnout in various job types is cause for concern, as it has a multitude of undesirable consequences for people and for the organisations in which burnout is occurring. In the article by Swider & Zimmerman (2010) the individual negative effects of burnout include suffering from work/family conflict, sleep disturbances, physical illnesses and substance abuse (see Bacharach et al., 1991; Belcastro & Gold, 1983; Jackson & Maslach, 1982; Maslach & Jackson, 1981), while the organisational impact of burnout includes; increased absenteeism, increased turnover and reduced client and colleague interactions and reduced job performance (see Jackson et al., 1986, Maslach et al., 2001; Parker & Kulik, 1995 and Wright & Cropanzano, 1998). In the article by Hakanen and Schaufeli (2012), additional consequences of burnout for organisations and society at large are mentioned, including long-lasting work disability (Ahola et al., 2009a, 2009b, as cited in Hakanen & Schaufeli, 2012) and hospitalisation as a result of mental and cardiovascular disorders (Toppinen-Tanner et al., 2009, as cited in Hakanen & Schaufeli, 2012).

Burnout was initially focused on solely in client-based professions (Maslach & Jackson, 1981, as cited in Swider & Zimmerman, 2010). However, various authors reason that burnout is not only present in client-based or human service-based professions, but also extends to other professions. The main arguments for extending burnout to being present in other professions is that there is not much of a theoretical rationale for burnout being present only in human service professions (Maslach & Leiter, 1997 and Schaufeli & Enzmann, 1998, as cited in Demerouti, Bakker, Bachreiner & Shaufeli, 2001). A large volume of empirical evidence indicates that the stressors leading to burnout in human service professions could also be found in other places of work (Buunk et al., 1998 and Khan & Byosiere, 1992, as cited in Demerouti et al., 2001) and, lastly, the Job Demands-Resources (JD-R) model assumes that the development of burnout results from job demands that are high and job resources that are low, regardless of the occupation type of the

individual (Demerouti et al., 2001). Researchers have also specifically come to the realisation that employees working in more autonomous jobs also experience burnout (Maslach et al., 2001). The article by Aghaz and Sheikh (2016) shows that knowledge workers can be identified, among other characteristics, by their autonomous working context. According to the article, knowledge workers have heightened levels of autonomy, less rigid organisational liabilities, and management and control that are more self-centred (Deetz, 1998; Robertson & O'Malley Hammersley, 2000, as cited in Aghaz and Sheikh, 2016), which leads these professionals to experience increased ambiguity across a wide area of their work.

The knowledge workers working in knowledge-intensive work settings play a significant role in achieving and maintaining a competitive advantage for organisations. Drucker (1999), one of the researchers known for popularising the term knowledge worker (Pyöriä (2005), describes knowledge workers, together with their productivity, as the most valuable asset for 21st-century institutions, regardless of whether they are focused on business or non-business interests. Various classifications of what constitutes knowledge work are available. Porat (1998, pp.103-113, as cited in Figurska, 2015b) identifies five distinct groups of knowledge workers. The first group includes scientists, engineers, lawyers, architects, accountants, computer programmers, etc., while the second group include teachers, librarians, archivists, editors, journalists, etc. A third group of knowledge workers include market search and coordination specialists, such as interviewers and enumerators, estimators, investigators, surveyors, buyers, shippers, brokers, auctioneers, advertising agents, salesmen, administrators, managers and process control workers. A fourth group of knowledge workers are known as information processors: proof-readers, typists, bank tellers, file clerks, telegraph messengers, bookkeepers, secretaries, statistical clerks, cashiers, salesclerks, etc. The fifth, and final, group of knowledge workers are called the information machine workers: stenographers, printing apprentices, data-processing machine repair, computer/telegraph/telephone/radio operators, telephone installers, etc.

Reinhardt et al. (2011, p. 160) propose that knowledge workers should be classified based on their roles and the actions that they are required to execute as part of their daily work, because knowledge workers can play different roles in the organisations for which they work. As such, the types of knowledge workers and the roles they play (as described below) are determined largely by the kind of work they perform within the organisation.

- Controllers: utilise raw information to monitor organisational performance

- Helpers: transfer information to educate others to solve the particular problem by themselves
- Learners: improve personal skills and competence by utilising information and practices
- Linkers: generate new information by associating and combining information from different sources
- Networkers: generate personal or project-related relationships with people involved in similar work to share information and support one another
- Organisers: involved in planning activities of a personal or organisational nature, e.g. to-do lists and scheduling
- Retrievers: search for and acquire information on a specific topic
- Sharers: distribute information among a community
- Solvers: find or provide a way to manage a problem, and track, monitor and react to actions, both personal and organisational in nature, that have the potential of becoming problems

Austin (2002, as cited in Figurska, 2015b), Nickols (2012) and Bernstein (2010) have drawn up general, overarching definitions of knowledge workers. According to Austin (2002, as cited in Figurska, 2015b), knowledge workers are oriented towards exploring, experiencing and trying, and they create value primarily through the manipulation of ideas or symbols. These processes occur primarily in the intellectual domain. Nickols (2012) says knowledge work involves the action of transforming information into different forms; therefore, the outcomes obtained from the knowledge work processes are often intangible. Bernstein (2010, p. 6) describes knowledge work as an interaction between various components: technology, organisations, information and people. Technology is the driver of productivity and knowledge work, information is the foundation of knowledge and decision-making, people are the executors responsible for performing the work, while organisations provide both the structure and the networks for knowledge work.

Another classification of knowledge work is provided by Morello and Caldwell (2001), who distinguish three types of knowledge work: skill-based, task-based and innovation-focused knowledge work. Firstly, skill-based knowledge work includes domains of expertise that are well-defined, well-prescribed, demonstrable and conducive to hands-on training and apprenticeships. Secondly, task-based knowledge work is focused on operational processes that are clear, routines that are pre-engineered, along with well-defined responses and administrative activities. Innovation-focused knowledge work is characterised by tacit knowledge, high levels of creativity,

intense collaborations among individuals, communities of practice, high levels of improvisation and extensive role versatility.

According to Morello and Caldwell (2001), knowledge work transforms employees who are task-based and skill-based workers into employees who are asked, expected and empowered to make value-added decisions instantly, regardless of whether in the office, on the manufacturing floor, in customer service departments or on delivery routes. Core knowledge work activities involve applying, presenting, sharing, analysing, organising, evaluating, retrieving, storing and securing information for the purpose of decision-making and service delivery. These activities are supported or automated using the appropriate tools and applications (Bernstein, 2010, p. 4).

Reinhardt et al. (2011) state that distinguishing knowledge work from traditional work is not an easy task. It should be noted that identifying knowledge workers through their occupations brings about some concerns. This is due to the reasoning that globalisation, socio-economic development and technical advancement cause certain professions to disappear from the job market. It therefore is impossible to determine with absolute certainty which professions, based on knowledge creation and use, will be present and operate on the market in the coming decades. Figurska (2015, pp. 85–86) therefore believes that classifying people into a group called knowledge workers is not sufficient, but employees should rather be identified as knowledge workers on the basis of their work and professional career as well as passion being connected with actively participating in the process of knowledge management (localisation, acquiring, development, sharing, use and preservation).

According to Pyöriä (2005), the concept of knowledge work has not yet been defined adequately. While the concept itself has attracted the attention of scholars for decades and the amount of academic literature on this topic has increased, it still remains difficult to arrive at a clear and concise definition of knowledge work. Elliott and Jacobson (2002, as cited in Pyöriä, 2005) say the information age is still too new to define the role of the workforce making up the core of its being. Despite the lack of a clear and concise definition, attempts have been made to characterise labour primarily involving information. This has evolved to include certain themes in both the empirical and theoretical literature. These themes include items such as a high level of education and skill, as well as the use of information technology as an important component of the informational labour process (Amar, 2002, Cortada, 1998, Horibe, 1999 and Newell et al., 2002, as cited in Pyöriä, 2005).

In conclusion, for the purpose of the current research study, knowledge workers are defined by using a combination of all definitions provided above. Knowledge workers are defined as people who are actively participating in the process of knowledge management (localisation, acquiring, development, sharing, use and preservation), in line with Figurska (2015b, pp. 85–86), as this definition accounts for information attainment, manipulation, creation and distribution, which are common across all definitions discussed thus (Amar, 2002, Cortada, 1998, Horibe, 1999 and Newell et al., 2002, as cited in Pyöriä, 2005; Morello & Caldwell, 2001; Reinhardt et al., 2011, p. 160). In this definition, the only employee types who excluded from the title of knowledge worker would be blue-collar workers, as their work is characterised by strength and physical skills and not office work (Blue-collar, n.d.; Drucker, 2007, p. 3).

While all employees are important in the pursuit of a competitive advantage, it is the knowledge worker whose basic work task is that of thinking. And while all jobs contain a combination of mental, physical and social work, it is the constant processing of unique problems that requires innovative and creative thinking by employees in order to solve the problems that characterises knowledge workers (Reinhardt et al., 2011). The demands placed on knowledge workers originates from the abovementioned requirements. As a result, these professionals experience more emotional and mental stress and are expected to do more, as they are expected to produce innovative solutions on a constant basis (Alvesson, 2004, as cited in Aghaz & Sheikh, 2016).

The theory of person-environment fit (P-E fit) provides insight into the type of employees who would be drawn towards a career in the knowledge-intensive work setting that would classify them as knowledge workers. The conceptualisation of P-E fit includes both person-organisation fit (P-O fit) and person-job fit (P-J fit). P-J fit consists of a needs-supplies perspective and a demands-abilities perspective (Edwards, 1991, as cited in Sekiguchi, 2004). The demands-abilities perspective comprises job demands that are required to ensure the completion of work tasks and the employees' abilities to meet the job requirements. Job demands comprise the knowledge, skills and abilities required to perform at a satisfactory level in the job (Caldwell & O'Reilly, 1990; Wilkand & Sackett, 1996, as cited in Sekiguchi, 2004). Abilities comprise education as well as experience, along with employee aptitudes or, alternatively, knowledge, skills and abilities (Caldwell & O'Reilly, 1990; Dawis & Lofquist, 1984 and French et al., 1982, as cited in Sekiguchi, 2004).

If the logic of the P-J fit demand-abilities perspective is applied to the current research study, the following can be deduced: Knowledge workers are employed primarily for their skills, expertise

and experience (Reinhardt et al., 2011). It is clear from the work of Reinhardt et al. (2011) and Suddaby et al. (as cited in Aghaz & Sheikh, 2016), that the job demands on knowledge workers requires them to be creative and innovative and to have the skill set to solve complex problems. A certain type of individual, the evening chronotype, is known to possess attributes in line with what is expected of knowledge workers. These attributes are creativity, innovative thinking and slightly higher intelligence (Giampietro & Cavallera, 2007; Piffer et al., 2014; Simor & Polner, 2017; Stolarski & Jankowski, 2015). Chronotype, alternatively known as morningness-eveningness, refers to the individual preference for the time of day during which activities are carried out (Vitale et al., 2015). There are three distinct categories of chronotypes, namely morning types, intermediate types and evening types (Diaz-Morales et al., 2015). It therefore is argued that individuals will self-select into jobs that fit their chronotype and that evening chronotypes, specifically, will self-select into jobs within the knowledge-intensive work setting, therefore making them knowledge workers.

The discussion thus far has argued for the value that knowledge workers can add to the attainment of a competitive advantage, and also has indicated that certain people factors related to well-being are vital in this attainment process. The problem that arises, however, is that knowledge workers are known to have high levels of burnout, which can prevent the attainment of a competitive advantage. Research focusing on the knowledge-intensive work setting found that job burnout among professionals has increased over the years (Crowley, 2012 and Lucas, 2015, as cited in Aghaz & Sheikh, 2016). Professionals are increasingly becoming overwhelmed with stress and anxiety, leading to burnout (Lu & Cursoy, 2016, as cited in Aghaz & Sheikh, 2016). Other researchers have found that job burnout rates are increasing among professionals and employees working in the knowledge-intensive setting, which is believed to be influenced and worsened by the high levels of expected qualifications, efficiency and professionalism (Hetland et al., 2007 and Tymon & Stumpf, 2003, as cited in Aghaz & Sheikh, 2016). In organisations using the creation and utilisation of knowledge as the foundation for their competitiveness, it becomes essential to obtain a high level of engagement among their knowledge workers (Figurska, 2015a). One of the major factors in determining the contribution that knowledge workers make to the success of the organisations in which they work is their commitment to their work, therefore organisations employing knowledge workers should encourage a culture of engagement (Figurska, 2015a). The work engagement levels of knowledge workers, together with burnout, is an important focus area in terms of well-being and motivation among knowledge workers. While burnout needs to be avoided or reduced among knowledge workers, work engagement is to be gained and increased.

The JD-R model can be applied to the investigation, with burnout and work engagement serving as dependent variables and the knowledge worker as sample group, as burnout and work engagement are often found in the well-being literature and have been well researched in a wide variety of professions. The concept of burnout extends beyond simply the helping professions (Demerouti et al., 2001), while work engagement was originally developed from the burnout research to include the full range of employee well-being, from unwell-being to well-being (Maslach et al., 2001).

1.2 Research Problem

A case has been made for the role of having engaged employees and a workforce with reduced burnout levels in the generation of a competitive advantage by organisations. Knowledge workers' work engagement levels are important to consider, as work engagement is vitally important in driving a competitive advantage, and these employees are vital in this regard. According to Figurska (2015b), it is worthwhile investigating whether the engagement of knowledge workers is a constant feature, or whether it is possible to influence it.

Given the above argument, the research problem is: Why do some knowledge workers experience high levels of work engagement and burnout, while others do not?

1.3 Research-initiating Question

The research-initiating question of this study is: Why does variance exist in the work engagement and burnout levels of knowledge workers?

1.4 Research Aim

Given the abovementioned research-initiating question, the aim for the current study was: Propose and explore influences that would account for variance in the burnout and work engagement levels of employees working in a knowledge-intensive work setting.

1.5 Research Objectives

The objectives of the current research study are: to develop a conceptual model that illustrates latent variables that would account for variance in employee engagement and burnout among knowledge workers; test whether the constructed structural model fits; evaluate whether the hypothesised paths in the model are statistically significant; examine the modification indices to establish whether changes are required in the model; and finally, highlight the findings and implications for management based on the research conducted.

CHAPTER 2

LITERATURE REVIEW

2.1 Introduction

The literature review provides a systematic review and critical evaluation of the relevant literature to investigate the research problem stated in Chapter 1. Firstly, various theories of occupational health are discussed by evaluating their fitness for purpose for the current study. Secondly, justifications are provided for the Job Demands-Resources Model, followed by a review of the model. Thirdly, the constructs applicable to the current study supported by the JD-R are discussed. Fourthly, various relationships between the relevant constructs are considered and a hypothesis is determined based on the above. And finally, a conceptual model is provided.

2.2 Frame of reference for the research study

A great deal of research has resulted in a significant number of potential causes of employee well-being; however, theoretical development has been limited (Bakker & Demerouti, 2007). Various studies have used long lists of variables to forecast employee well-being, or have relied on one of the two available influential job stress models: the demands-control model (Karasek 1979, as cited in Bakker & Demerouti, 2007) and the effort-reward imbalance model (Siegrist 1996, as cited in Bakker & Demerouti, 2007). The strengths and weaknesses of the models are discussed in the context of their potential to predict employee well-being, followed by a justification for utilising the job demands resources (JD-R) model to accomplish the same goal.

2.2.1 Previous theories of occupational health

In this section, the demands-control model and effort-reward imbalance model are discussed. These two models are evaluated critically, and justification is provided to illustrate that the JD-R theory is a better model of occupational health. Finally, the premises of the JD-R theory are discussed.

2.2.1.1 Demands-control model

Several models of occupational health are founded on the principle that job strain is caused by alterations in the balance between the demands and resources of the employee. To illustrate this, and according to the well-known demands-control model (DCM; Karasek, 1979, as cited in Bakker and Demerouti, 2007), job strain occurs from mixing high job demands, e.g. time pressure, work

overload and low job control. Job control is defined as the potential control that individuals have over their tasks and their behaviour throughout a working day (Karasek, 1979, as cited in Bakker & Demerouti, 2007). Thus, one of the basic premises of the DCM is that employees who have the autonomy to make their own decisions with regard to meeting their job demands do not fall victim to job strain, examples of which are health complaints, job-related anxiety, exhaustion and dissatisfaction.

Empirical studies indicate that a key predictor of illness and psychological strain is the mixture of job demands that are high while job control is low (Karasek, 1979 and Schnall et al., 1994, as cited in Bakker & Demerouti, 2007). While there is substantial support for the strain hypothesis, the same cannot be said regarding the buffer hypothesis. The buffer hypothesis is based on the premise that control has the ability to moderate the negative effects of high demands on an individual's well-being (De Jonge & Kompier, 1997 and Van der Doef & Maes, 1999, as cited in Bakker & Demerouti, 2007).

The discrepancy between the evidence for the strain hypothesis and the buffer hypothesis potentially suggests that job control has the potential to buffer the influence of job demands on employee well-being only partly. Regardless of these inconclusive findings, the DCM has been the most significant model among the empirical research conducted on job stress and health over the past twenty years (see also Cordery, 1997, as cited in Bakker & Demerouti, 2007).

2.2.1.2 Effort-reward imbalance model

The effort-reward imbalance model (ERIM) (Siegrist, 1996, as cited in Bakker & Demerouti, 2007) focuses on rewards as opposed to the control structure of the work context. The ERIM is based on the premise that job strain takes place due to an imbalance between effort and reward. In this context, examples of effort include extrinsic job demands and intrinsic motivation to meet these demands, and rewards include salary and security/career opportunities, such as job security, status consistency, promotion prospects and esteem reward. The ERIM assumes that a shortage of exchanges between effort and reward, for example, high effort and low reward conditions, will result in arousal and stress (cf. equity theory; Walster et al., 1978, as cited in Bakker & Demerouti, 2007), which then result in cardiovascular risks and other negative effects of strain. For example, an employee in a demanding yet unstable job that is achieving at a high level but lacks opportunities for a promotion is an example of a stressful imbalance (De Jonge et al., 2000). The combination of high effort and low reward is a risk factor for various health and well-being outcomes, such as subjective health, cardiovascular health, burnout and mild psychiatric disorders

(for a review, see Van Vegchel et al., 2005, as cited in Bakker & Demerouti, 2007). The ERIM introduces a personal component to the model, which the DCM does not. The personal component is that of over-commitment, which is a combination of behaviours, attitudes and emotions that indicate disproportionate striving, together with a strong desire for approval and esteem. Based on the model, over-commitment may serve as a moderator of the relationship between effort-reward imbalance and employee well-being. Therefore, according to the model, personality is expected to have an additional effect on the interaction between effort and reward. Studies such as those by De Jonge et al. (2000) have found support for the patterns discussed.

2.2.1.3 Critical evaluation of the DRM and ERIM

In the article by Bakker and Demerouti (2007), the DCM and ERIM are discussed with regard to their strengths and weaknesses to provide a critical evaluation of the models as occupational well-being models focusing on job strain. The strength of both models is first highlighted, followed by a discussion of their weaknesses.

Both the DCM and the ERIM are based on the premise that job demands result in job strain, and sometimes, in severe situations, in burnout because certain job resources are lacking. An example of a job resource in the DCM would be autonomy, while examples in the ERIM include esteem reward, salary, and security/career opportunities. An asset of both models is their simplicity, although this could also be considered as their weakness (Bakker & Demerouti, 2007).

The weakness of both models' simplicity, as set out by Bakker and Demerouti (2007), stems from the concern that the complexity of the working environment is reduced to minimal variables within these models. Therefore, their simplification does not do justice to the complex reality within the working environment. Well-being research on employees has shown that many job demands and (a lacks of) job resources are potential predictors. The list includes high psychological and physical job demands, e.g. a lack of rewards as well as a lack of autonomy, but also a lack of social support from colleagues, emotional demands, performance feedback, supervisory support and many others (see Halbesleben & Buckley, 2004; Kahn & Byosiere, 1992, as cited in Bakker & Demerouti, 2007; Lee & Ashforth, 1996). Knowing that there are many other examples of job demands and job resources, the question arises whether the DCM and the ERIM would still be relevant across all types of jobs and whether certain occupations might not contain other job demands or a lack of certain job resources that are unaccounted for in the model (Bakker & Demerouti, 2007). Some researchers have acknowledged this gap in the models and included physical and emotional

demands in the DCM and ERIM (De Jonge et al., 1999 and Van Vegchel et al., 2002, as cited in Bakker & Demerouti, 2007).

Another point raised by Bakker and Demerouti (2007) is the fixed character of the models. Clarity is lacking on why employees regard autonomy as a critical resource in the DCM and social support as a critical resource in the extended demand-control support model (Johnson & Hall, 1988, as cited in Bakker & Demerouti, 2007). It is possible that totally different resources prevail in certain work situations. Similarly, both models do not allow for the inclusion of other factors found in the literature that are related to the well-being of employees in the workplace. In the ERIM (Siegrist, 1996, as cited in Bakker & Demerouti, 2007), salary, reward, esteem and status control are the most vital job resources that may make up for the detrimental impact of job demands on strain. The question therefore is why is autonomy not incorporated into the effort-reward imbalance model? Are salary and status control more vital than other job resources, such as task identity and relationships with superiors? It is also unclear why work pressure or intrinsic and extrinsic effort should always be the most vital job demands. Based on the evidence, it seems that the researchers gave preference to specific components of the work environment, while others are ignored. This is a severe shortcoming of the models, since it is well known that certain job demands, like emotional demands, occur often in certain professions, while being near absent in other occupations. Karasek (1979, as cited in Bakker & Demerouti (2007), notes that a wider range of job demands and resources are relevant to the literature; however, most studies on the DCM and ERIM have nonetheless been constrained by a specific and limiting set of independent variables that are possibly irrelevant to all jobs (Bakker & Demerouti, 2007).

2.2.2 Justifying JD-R theory

JD-R theory was developed out of the limitations of the earlier models of occupational stress and motivation in an attempt to overcome these limitations (Bakker & Demerouti, 2007). JD-R theory is less rigid than the previous models and is more specific, since it includes a variety of job demands and resources based on the occupational context of each study (Bakker & Demerouti, 2007). The focus of JD-R theory is on both the negative and positive signs of employee well-being, and it therefore can be considered in the context of any profession and utilised for the improvement of employee well-being and performance (Bakker & Demerouti, 2007). JD-R theory therefore extends the DCM and ERIM by being more flexible and rigorous. Van Veldhoven et al. (2005, as cited in Bakker and Demerouti (2007) measured the demand-control-support model with JD-R theory using data from 37 291 Dutch employees and found that the theory explained the

relationship between the health, work characteristics and well-being of the employees. Similarly, Lewig and Dollard (2003, as cited in Bakker and Demerouti, 2007) found in a study of employees in an Australian call centre that JD-R theory explained more variance in emotional exhaustion and job satisfaction than the DCM or the ERI model.

2.2.3 JD-R theory

Based on JD-R theory, a health impairment process originates from job demands, while a motivational process originates from job resources (Demerouti & Bakker, 2011). The model also indicates the manner in which demands and resources behave in combination with one another to predict important organisational outcomes (Demerouti & Bakker, 2011). The model has been shown, in previous research, to hold true for self-reports as well as objective data (Demerouti & Bakker, 2011). Studies by authors such as Demerouti et al. (2001) and Schaufeli and Bakker (2004) also indicate that JD-R theory can predict the burnout and work engagement of employees.

2.2.3.1 Main premise of JD-R theory

The foundation of JD-R theory is that every profession is associated with specific risk factors related to job stress. Two general categories are used to classify the risk factors for job stress: job demands and job resources. This constitutes an all-encompassing model that can be used in any occupational setting, regardless of the specific demands and resources involved (Demerouti & Bakker, 2011).

Job demands refer to four aspects of a job: organisational, psychological, physical and social, which require constant physical and/or psychological effort by or skills of the employee and, as a result, are accompanied by psychological and physiological costs. Examples of job demands includes high work pressure, irregular working hours and unfavourable physical environment. While job demands are not all inherently harmful to the employee, they have the potential to transform into job stressors if they require high effort from the employee and the employee is unable to recover adequately from this effort (Meijman & Mulder, 1998, as cited in Demerouti & Bakker, 2011).

Job resources are the social, psychological, physical or organisational characteristics of a job that enable the achievement of work goals, thereby reducing job demands and their associated detrimental effects (physiological and psychological) and encouraging learning, personal growth and development.

Resources therefore are significant in managing job demands, but also important on their own for what they inherently are. This relates to Hackman and Oldham's (1980, as cited in Demerouti & Bakker, 2011) job characteristics model, which highlights the potential of job resources (autonomy, feedback and task significance) to motivate at the task level. It is also in line with the conservation of resources (COR) theory (Hobfoll, 2011), according to which the accumulation and maintenance of resources is the primal human motivation.

Resources therefore are valued for their inherent nature and as a method to achieve and protect other valued resources. Job resources are present on three levels, viz. the macro-organisational level, the task level and the interpersonal level. Job resources on the macro-organisational level include salary, job security, career opportunities and wages, while on the interpersonal level they include supervisor or co-worker support, team climate and specific job positions, such as involvement in decision-making and role clarity, while task-level job resources include task identity, skill variety, autonomy, task significance and performance feedback (Demerouti & Bakker, 2011).

2.2.3.1 Second premise of JD-R theory

Dual processes are a second premise of JD-R theory. Dual processes refer to the two different psychological processes that underlie the theory and play a role in the origin of job strain and motivation (Demerouti & Bakker, 2011).

According to Bakker and Demerouti (2018), the original version of JD-R theory, referred to as the JD-R model at the time (Demerouti et al., 2001), theorised that job demands could be the starting point for a health-impairment process. In the case that employees are exposed to a heavy workload on a continuous basis, it may transform into a form of chronic work overload over time. In this scenario, job demands result in chronic exhaustion, and ultimately lead to problems with physical health such as cardiovascular diseases, while job resources induce a motivational process. The reason for job resources' ability to provide meaning and satisfy basic needs is that they serve as a motivator and contribute to the work engagement of employees.

2.2.3.2 Third premise of JD-R theory

The third premise of JD-R theory, as discussed by Bakker and Demerouti (2018), states that job resources potentially could protect against the influence of job demands. Therefore, job demands and resources have main effects on their own, but also work together. Job resources are utilised in

equipping employees to manage their job demands. Some scholars have suggested that job resources and the specific job demand should match; however, Bakker and Demerouti (2018) indicate that a wide variety of job resources can provide protection against the effect of various job demands on negative strain (Bakker et al., 2005, 2010; Xanthopoulou et al., 2007), thus indicating that it is not necessary to match specific job resources with job demands.

2.2.3.3 Fourth premise of JD-R theory

The fourth premise of JD-R theory, as suggested by Bakker and Demerouti (2018), is that job resources are specifically important and effect motivation and work engagement during periods when high job demands are experienced. Job resources, such as autonomy, task identity, performance feedback and skill variety, become essential when job demands are very challenging. Hobfoll (2002) agrees with this notion, stating that resource gain alone has only a modest effect; however, it becomes salient when resource loss is a possibility. This implies that job resources acquire their motivational potential specifically when employees are experiencing high job demands. Stated differently, the coping hypothesis suggests that, under stressful conditions, employees are more likely to resort to their available resources as coping mechanisms to reduce stress (Demerouti & Bakker, 2011). Examples of this have been found in the research on Finnish teachers and dentists conducted by Bakker et al. (2007) and Hakanen et al. (2005), which indicates that job resources like appreciation, skill variety and innovativeness are most likely to predict work engagement during periods when job demands, such as pupil misbehaviour and unfavourable physical working environments, are high.

2.2.3.4 Fifth premise of JD-R theory

Premise five of JD-R theory states that personal resources have a similar role as job resources (Bakker & Demerouti, 2018). Personal resources are defined as the personal beliefs of individuals about the amount of control they can exert over their work situation. For example, employees high in optimism and self-efficacy (examples of personal resources) believe that positive occurrences will take place in their life and that they will be able to manage unforeseen events. These beliefs enable employees to approach and deal with their job demands in an effective manner. Research conducted by Bakker and Sanz-Vergel (2013) indicates that health-care nurses who are optimistic and self-efficacious can transform emotionally-demanding interactions into challenges and that they feel engaged in their work. The research also found that, when nurses realise that they have

many personal resources, they are better equipped to deal with potentially hindering job demands such as conflict and bureaucracy (Bakker & Sanz-Vergel, 2013).

2.2.3.5 Sixth premise of JD-R theory

Premise six of JD-R theory, as discussed by Bakker and Demerouti (2018), states that motivation affects job performance in a positive manner, while the effect of job strain is negative. Motivation enables employees to be focused on their goals and tasks, while job strain weakens their ability to focus, resulting in reduced performance. Employees who are suffering from exhaustion or anxiety are more likely to make mistakes, which has a negative effect on their performance (Bakker et al., 2008). Studies conducted by various researchers (Hopstaken et al., 2015, 2016) found that engaged employees perform better on tasks that are demanding due to focusing their attention on the task that is to be done, as shown by their brain activity, pupil diameter data and self-report data. Interestingly, the research by Xanthopoulou et al. (2009a), focusing on employees working in fast-food restaurants, indicated through a combination of diary reports and objective financial data that better financial results were obtained on the days when employees were highly work engaged.

2.2.3.6 Seventh premise of JD-R theory: Job crafting

The seventh premise of JD-R theory is discussed by Bakker and Demerouti (2017). According to the authors, the first decade of exploration of JD-R theory resulted in conclusive evidence of the initial six propositions by looking at a significant number of studies. Researchers conducting longitudinal studies found evidence of causal as well as reversed causal effects between job resources, demands and well-being. Hakanen et al. (2008) found that pride in the occupation, craftsmanship and positive feedback from work results as task-level job resources predicted the work engagement levels of dentists, while work engagement predicted personal initiative over three years. In addition, evidence was found for reversed causal effects. Other researchers found that personal initiative positively influenced work engagement, and that work engagement positively affected future job resources. Similarly, as indicated in premise six, job resources were also found to be predicted by personal resources, such as self-efficacy, optimism and self-esteem, as well as work engagement (Xanthopoulou et al., 2009b); however, evidence of reversed causal effects from personal resources and work engagement to job resources was also found. What these studies indicate is that engaged individuals are motivated to remain engaged and will develop more resources, such as feedback, support and autonomy, as time passes. This notion is in line with Hobfoll (2001), who maintains that individuals are determined to preserve their resources and are

driven to seek opportunities to increase their resource pool, if possible. The findings above allude to a newly introduced concept in JD-R theory, namely job crafting.

The original JD-R theory had a top-down view of job design in organisations, which meant that management and human resources departments designs work environments for the staff by means of setting job tasks and targets and supplying resources. Therefore, it was supposed that organisations designed the environment with job demands and resources that would allow employees to flourish or experience strain. The approach of JD-R theory therefore was similar to that of job strain and motivational approaches, such as the DCM and ERIM, in assuming that employees are largely reactive to their working environment (Bakker & Demerouti, 2017).

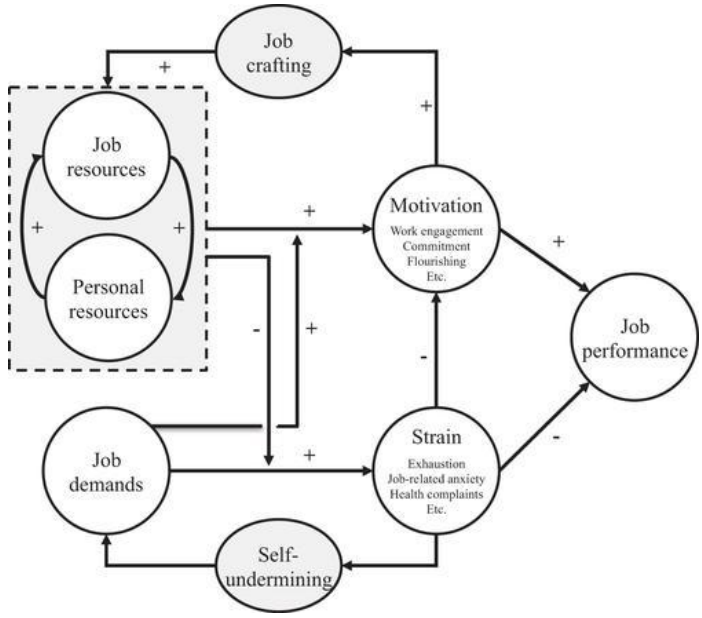
However, this could not be true, as it would mean that all employees holding the same jobs should have the same working conditions, which they do not, since great variety is witnessed in the working conditions of employees holding the same jobs. This is due to employees being proactive and taking initiative to alter the working environment (Frese & Fay, 2001; Griffin et al., 2007). Researchers have argued that employees potentially engage in actions to proactively alter work tasks to make them more meaningful. The term job crafting was coined by Wrzesniewski and Dutton (2001) and refers to the proactive alterations that employees make within the working context. Task crafting refers to changes made to work tasks. Relationship crafting relates to the type of relationships as well as the frequency and duration of social interactions that employees participate in at work with colleagues, clients and providers. Cognitive crafting is the appraisal by employees of their work and refers to the personal meaning that employees ascribe to their work.

Tims et al. (2013) found that job crafting predicted positive changes in the work situation and was indirectly related to higher levels of work engagement and job satisfaction, and decreased burnout. Furthermore, Vogt et al. (2016), using a longitudinal design, found that employees who proactively build a work environment that is resourceful and challenging increased their own psychological capital and work engagement. In addition, Bakker et al. (2012) indicate that job crafting is positively associated with peer ratings of performance in the role through work engagement. Intervention studies stimulating job-crafting behaviours have had favourable effects on employee well-being and job performance. Therefore, engaged employees are able to utilise job crafting to construct a “gain spiral” of resources and work engagement.

Given the compelling evidence in support of JD-R theory and the relevant model, which can be seen in Figure 1 (Bakker & Demerouti, 2017), the theory is utilised as the framework for the current study.

Figure 1

Job Demands-Resources Model (JDRM)



(Bakker & Demerouti, 2017)

2.3 Common Job Demands and Resources

According to Bakker and Demerouti (2018), workload, complex tasks and conflicts could be regarded as job demands, while Mauno et al. (2007) say examples of job demands include quantitative workload, role ambiguity and job insecurity. Schaufeli and Taris (2014) reviewed nine studies on the JD-R model and found the following job demands: emotional demands, mental demands, physical demands, work overload, work-home conflict, work underload, harassment, negative change, bureaucracy, pace of change, and interpersonal conflicts.

According to Bakker and Demerouti (2018), job resources are performance feedback, skill variety and social support. In a meta-analytic study on resources in relation to performance and well-being, Nielsen et al. (2017) highlight job resources such as social support and team learning or team climate as group-level resources. Group-level resources also included job crafting in their study. On a leader level, leader-member exchange was investigated as a resource, as were transactional leadership and supervisor social support. On an organisational level, autonomy, along with all five job characteristics, namely compensation-based schemes, career-supporting activities, training, person-organisation fit and performance appraisal, were investigated by Hackman and Oldham (1976). Schaufeli (2017) compiled the following collection of job resources from his inquiries into other research studies that investigated them in relation to the context of the JD-R model: co-

worker support, team effectiveness, team atmosphere, supervisor support, role clarity, recognition, fulfilment of expectations, job control, use of skills, participation in decision-making, task variety, communications, person-job fit, availability of tools, performance feedback, alignment, trust in leadership, value congruence, organisational justice, possibilities for learning and development, fair pay and career perspective.

According to Bakker and Demerouti (2018), self-efficacy and optimism are personal resources. In a meta-analytic study of resources in relation to performance and well-being, Nielsen et al. (2017) include the following as personal/individual resources in their meta-analytic study: optimism, self-efficacy, resilience and hope, which together comprise psychological capital (PsyCap; Luthans & Youssef, 2004). In the article by Schaufeli (2017), a number of personal resources are mentioned in his list of personal resources found in other research studies within the JD-R model context: self-efficacy, proactivity, resilience, flexibility, optimism, goal directedness, setting one's own limits, and self-development. Within the literature, a few new additions were encountered in studies applying JD-R. Grover et al. (2017) found evidence for mindfulness as a personal resource in their empirical study, while conscientiousness is regarded as a personal resource by Zellars et al. (2006).

It was decided to examine the influence of the following variables on the burnout and work engagement levels of knowledge workers: chronotype, work overload, conscientiousness and workplace flexibility. Chronotype was included in the study as a special variable, given its argued connection with knowledge workers through creativity, innovation and intelligence, as discussed in Section 1; work overload was included as a job demand, given that it is a common occurrence across many professions and is regularly and well-researched as a job demand in studies utilising the JD-R model as framework; conscientiousness was included, given its largely unexplored inclusion as a personal resource in the JD-R model; the only source found that regarded conscientiousness as a personal resource was the work of Zellars et al. (2006). Finally, workplace flexibility was introduced as a job resource given Bellicoso et al.'s (2014) suggestion that working during one's preferred time of day could reduce burnout levels. Workplace flexibility comprises employers providing their employees and supervisors with the option of 'where', 'how', 'when', and 'how much' work is done (Center on Aging & Work, n.d., as cited in Pitt-Catsouphes & Matz-Costa, 2008). This would provide employees with the flexibility to schedule their work according to the time, order and locations that suit their personal preference.

2.4 Relevant Latent Variables

2.4.1 Engagement

Engagement, according to Schaufeli and Bakker (2004), is an activated and positive cognitive state characterised by dedication, vigour and absorption in terms of work. The vigour dimension is characterised by high levels of energy and mental resilience during work activities. The second dimension, dedication, describes the level of involvement individuals have in terms of the work they do, as well as the amount and significance of enthusiasm, and the challenges employees experience in their work. The final dimension, absorption, describes the state of employees being completely focused and positively absorbed in work tasks, resulting in them experiencing time as passing quickly while working (Schaufeli & Bakker, 2004).

Work engagement is not a constant state, but rather a dynamic motivational state that changes as employees are exposed to different tasks and have different encounters throughout the working day (Sonnentag et al., 2010, as cited in Bledow et al., 2011). Work engagement is not the same as other, similar concepts like work-related flow, job satisfaction and motivation. The distinction between job satisfaction and work engagement is that it is a blend of high work pleasure (dedication dimension) and high activation (absorption and vigour dimensions), while job satisfaction would be regarded as a construct that is more passive in nature. Work-related flow is shorter in duration (up to one hour), while work engagement is a longer period of constant performance. Work engagement and motivation are also often viewed as similar concepts; however, work engagement differs from the concept of motivation as it indicates both cognition and affect – cognition via the absorption dimension and affect through the vigour dimension (Bakker, 2011). The final concept similar to that of work engagement is workaholism. While both these concepts involve being immersed in work and feeling entrenched in work, work engagement is different as it does not have the negative effects of workaholism, such as excessive working and working to the point of not enjoying it, while still having the drive to work without being enforced by organisational demands (Bonebright et al., 2000, as cited in Sussman, 2012). Therefore, workaholism is essentially working compulsively without liking it, to the point that it creates lifestyle imbalances (Aziz & Zickar, 2006, as cited in Sussman, 2012).

The foundation for the inclusion of work engagement in this study was based on the discussion of its antecedents and consequences. Numerous investigations have indicated that work engagement leads to positive outcomes for both the individual and the organisation. One important positive outcome on the organisation level is better performance because of work engagement. Bakker and

Demerouti (2008), possible reasons for the better performance of employees high in engagement were ascribed to better health, creating their own job and personal resources, positive emotions, and transferring their engagement to others.

Bakker, Demerouti and Sanz-Vergel (2014) indicate that work engagement is a highly desirable characteristic of employees in both contemporary public and private organisations, as high work engagement levels correspond with high levels of creativity, client satisfaction, organisational citizenship behaviour (OCB) and task performance. According to Gawke, Gorgievski, and Bakker (2017) and Orth and Vomer (2017), work-engaged employees are more open to new experiences. This results in them having more creative ideas and leads to them being more innovative and entrepreneurial. This highlights a very important reason why work engagement would be relevant to knowledge workers and therefore to the current research study. In Chapter 1, it was pointed out that knowledge workers are required to be creative and innovative, and work-engaged employees are known to have higher levels of creativity. This indicates that fostering work engagement among knowledge workers would be of value to organisations that employ them. Work engagement predicts employee, organisational and team outcomes very well. Engaged employees show better performance in their roles due to their dedication to and focus on their work activities (Christian, Garza and Slaughter, 2011), and this gives rise to better financial results (Xanthopoulou et al., 2009a). Engaged employees are more inclined to have creative ideas and a higher volume of such ideas, as well as being more innovative and entrepreneurial because of their openness to new experiences (Gawke et al., 2017 and Orth & Volmer, 2017).

Empirical studies indicating the benefits of work engagement are discussed below, specifically focusing on studies that utilised individuals who can be regarded as knowledge workers per the classifications discussed in Chapter 1.

Bakker and Bal (2010) studied fifty-four starting teachers who maintained weekly diaries and found that these teachers' daily levels of autonomy, exchange with their supervisor and opportunities for development were positively related to work engagement, which in turn was positively related to weekly job performance. Among Finnish educational staff, work engagement, self-rated health and working ability were found to be positively associated (Hakanen, 2002, as cited in Bakker et al., 2007).

Within a business context, employee engagement was found to be positively related to the performance of business units as measured by productivity, profitability, customer satisfaction, turnover, loyalty and safety (Harter et al., 2002). Based on the findings by Harter et al. (2002, p.

276), it was concluded that satisfaction and engagement are "related to meaningful business outcomes at a magnitude that is important to many organisations".

Engagement is typically measured using the Utrecht Work Engagement Scale and includes dedication, vigour and absorption as subscales. Validation of the scale has been done among three population groups: Spanish (Schaufeli et al., 2002, as cited in Bakker et al., 2007), Finnish (Hakanen, 2002, as cited in Bakker et al., 2007) and Dutch employees (Schaufeli & Bakker, 2004).

2.4.2 Burnout

Burnout is a negative emotional job response caused by continued exposure to a stressful work environment over a lengthy period of time (Maslach & Jackson, 1984, as cited in Alarcon et al., 2009; Maslach et al., 2001). Similarly, Bellicoso et al. (2014) state that burnout originates from emotional and physical fatigue or exhaustion, feelings of cognitive weariness and lasting depletion of energy resources due to continuous stress.

The first burnout research was conducted on samples of employees working in the helping professions (such as nurses, psychotherapists and social workers; Maslach & Jackson, 1981, as cited in Alarcon et al., 2009), as researchers recognised that employees in these professions often experience severe fatigue as well as reduced idealism (Alarcon et al., 2009).

Later, authors started challenging the view that burnout is only found within the human service sectors (e.g. health care, social work and teaching) (Maslach & Schaufeli, 1993, as cited in Demerouti et al., 2001). Regardless of the notion being studied, work involving people has become inherently associated with burnout, as researchers were only investigating situations in which such work was being done (Demerouti et al., 2001). Since then, many researcher have focused on occupational groups other than those working with people, such as engineers (Bacharach et al., 1991, as cited in Lingard 2003), senior executives (Dolan, 1995, as cited in Lingard, 2003), human resource managers and other professional occupational groups (Cordes et al., 1997, as cited in Lingard, 2003).

Given that burnout was first defined in the context of human services, Maslach, Jackson, and Leiter (1996) defined burnout more widely to include professions not within the human services. By this definition, burnout is a condition of exhaustion during which the individual becomes cynical in their thinking about the value that their occupation offers and doubtful about their performance capacity. The three core dimensions of burnout are cynicism and disinterest in work, an overwhelming exhaustion, and a sense of feeling unaccomplished and ineffective. According to

Maslach et al. (1996), the dimensions of burnout are conceptually different based on the type of job. The dimensions of burnout among the helping profession are referred to as depersonalisation, low personal accomplishment and emotional exhaustion, while among other professions the dimensions are known as exhaustion, cynicism and low personal efficiency (Maslach et al., 1996; Rothmann, 2003).

According to Maslach et al. (2001), the dimension of burnout that is most obvious in its manifestation is that of emotional exhaustion. Emotional exhaustion is described as feeling drained because of work. The authors state that emotional exhaustion is the central characteristic of burnout, and the most widely reported and thoroughly analysed of the three dimensions. According to Demerouti and Bakker (2008), exhaustion results from intense physical, cognitive and emotional strain. For example, exhaustion occurs because of constant experiences of specific job demands (such as work overload) and, as a result, employees detach themselves both cognitively and emotionally from their job (Maslach et al., 2001). The characteristic markers of emotional exhaustion are: feelings of extreme tiredness, emotional depletion, a lack of energy, and feeling drained of emotional resources that could serve as coping mechanisms for continuing job demands.

Depersonalisation is a strategy that individuals launch to distance themselves from clients, patients and other service recipients by turning to behaviours such as becoming callous, impersonal and hardening themselves to others (Demerouti & Bakker, 2008; Maslach et al., 2001). Burned-out employees therefore use the strategy of considering others as impersonal objects of work. Individuals suffering from burnout also become indifferent and cynical (depersonalisation) when they are discouraged and exhausted (Maslach et al., 2001). Consequently, the majority of burnout research reflects a strong connection between exhaustion and cynicism (depersonalisation). According to Hakanen et al. (2006), cynicism is characterised by being distant or having an attitude of indifference to both co-workers and work in general, together with disinterest in work and a sense that work is without meaning.

The final dimension of burnout is reduced personal accomplishment, also known as personal efficacy. This dimension is described as reduced feelings of accomplishment, as well as reduced feelings of successfully achieving a goal and being competent in one's job and the organisation (Hakanen et al., 2006). According to Maslach et al. (2001), a person's perception of effectiveness is lowered when job demands are high and cause exhaustion and cynicism. Accordingly, it can be said that a lack of efficacy starts from a shortage of resources, while social conflict and work overload results in cynicism and exhaustion. Demerouti and Bakker (2008) believe the dimension

of professional efficacy should not be included as one of the three dimensions of burnout, but rather interpreted as resulting due to burnout (Bakker, Demerouti, & Verbeke, 2004). Professional efficacy rather reflects a personality characteristic like self-efficacy (Shirom, 1989, as cited in Demerouti & Bakker, 2008). Leiter (1993, as cited in Demerouti et al., 2003) discovered that distancing oneself mentally, i.e. depersonalisation, occurs as a consequence of exhaustion, while personal efficacy arises on its own.

Burnout is connected to various negative consequences, such as absenteeism, job dissatisfaction, job turnover and low morale (Rothman, 2003). According to Maslach (2001, as cited in Hill & Curran, 2016), burnout is associated with considerable financial costs for organisations and contributes to reduced physical and mental health for individuals. For the organisation, burnout is associated with reduced motivation and reduced performance (Bakker et al., 2008; Yang, 2004, as cited in Hill & Curran, 2016).

Researchers such as Griffin et al. (2010, as cited in Ismail et al., 2013) and Wright et al. (2010) state that, given the complexity of burnout, its effects have detrimental consequences for an organisation's ability to strive for the attainment of a competitive advantage. This makes burnout relevant to the current research study, and also provides an argument for why burnout is worthy of investigation in terms of knowledge workers; if knowledge workers are important in the pursuit of a competitive advantage and they suffer from burnout, it will deter from the organisation's ability to achieve a competitive advantage, therefore justifying the investigation of burnout levels among knowledge workers. Furthermore, as stress is known to be a precursor of burnout, as illustrated in the definition of burnout (Maslach & Jackson, 1984, as cited in Alarcon et al., 2009; Maslach et al., 2001), and knowledge workers are known to suffer from high emotional and mental stress as a result of the continuous need to be creative and innovative (Alvesson, 2004, as cited in Aghaz & Sheikh, 2016), this provides a further indication that knowledge workers could be exposed to high levels of burnout.

Given the current research focus, studies are highlighted that focus on two examples of knowledge workers: engineers and lawyers. The first focus is on engineers in the construction industry, followed by a study of lawyers.

Despite professionals within the construction sector potentially being at high risk of developing burnout, very few research studies have focused on burnout in this industry. Lingard (2003) focused on construction industry professionals, including employees of consultancy firms, and

employees working for the contractor and for the supplier. The results, as depicted in Table 1 below, indicate the following significant predictors for each of the three dimensions of burnout.

Table 1

Significant Work and Personal Predictors of the Three Dimensions of Burnout

Dimension of burnout	Variable	Result
Emotional exhaustion	Tenure	β = -0.319, p = 0.001
	Overload	β = 0.302, p = 0.001
	Role conflict at work	β = 0.255, p = 0.010
	Neuroticism	β = 0.204, p = 0.027
Cynicism	Satisfaction with promotion prospects	β = -0.297, p = 0.000
	Responsibility	β = -0.183, p = 0.009
	Role clarity	β = -0.195, p = 0.003
	Satisfaction with pay	β = -0.150, p = 0.028
	Social aspect of extraversion	β = -0.233, p = 0.001
	Action aspect of extraversion	β = -0.211, p = 0.003
Personal competence	Neuroticism	β = -0.216, p = 0.003
	Quick wittedness	β = 0.203, p = 0.006
	Role clarity	β = 0.148, p = 0.046
	Satisfaction with promotion prospects	β = 0.197, p = 0.010

Emotional exhaustion (r = 0.293, p = 0.000) and cynicism (r = 0.536, p = 0.000) have been found to be significantly and positively correlated with turnover intention. However, for the respondents, both emotional exhaustion (β = 0.259, p = 0.003) and cynicism (β = 0.596, p = 0.000) have been shown to be significant predictors of their intention to quit their current employment. This indicates that burnout does not have a single cause, but is rather a complex interaction of characteristics of individuals and workplace issues. The same findings were found specifically for engineers, with cynicism and emotional exhaustion being major predictors of intention to quit their jobs.

A cross-sectional study was conducted on Taiwanese lawyers in Taipei between October 2007 and January 2008 by Tsai et al. (2009). Self-reported questionnaire surveys were collected from the 180 lawyers who completed the questionnaires. The results indicate that lawyers participating in the study reported higher scores for occupational stress (including psychological demands, co-worker support, supervisor support and job control) than the mean score of a national survey of working employees (Cheng et al., 2001). These lawyers also had higher scores for personal and work-related burnout as opposed to those of employees in both public and private companies reported in a previous study (Yeh et al., 2007, as cited in Tsai et al., 2009).

2.4.3 Special variable: Chronotype

According to Mokros et al. (2018), chronotype is an inherent preference for optimal time of day for operational activities that is personal and founded on an individual's biology. Chronotype manifests as circadian fluctuations of mood, energy levels and cognitive abilities. Circadian rhythms affect chronotype (Conway & Limayem, 2011), and chronotype refers to an individual's preference for morning or evening (Conway & Limayem, 2011). Similarly, other researchers state that morningness and eveningness indicate differences in circadian preference, which is also known as chronotype, and each type is associated with different preferences for carrying out various work tasks (Mullins et al., 2014). Morningness-eveningness is the optimal time for individuals' performance and is also the time of day when they are physically and cognitively most capable (Walker et al., 2015).

Morningness-eveningness comprises three distinct classifications of individuals: morning types, intermediate types and evening types (Merikanto et al., 2016). The distinction between them is based on the diurnal timing of their physiological functioning and their daily activities (Merikanto et al., 2016). Morning types peak early in the day. These morning chronotypes prefer to start work as early as possible (Conway & Limayem, 2011). The diurnal peak of intermediate types occurs later than that of morning types, but earlier than evening types, with evening types reaching their peak much later in the day and the latest of all (Duffy et al., 1999; Horne & Östberg, 1976). Therefore, evening chronotypes prefer to start work later in the day and work into the evening (Conway & Limayem, 2011). Based on the description and definitions of the concepts of chronotype and morningness-eveningness, it is clearly that chronotype refers to a preference for morningness or eveningness, while the morningness-eveningness construct refers to peak functioning. In the article by Magnavita and Garbarino (2017), chronotype, circadian preference and morningness-eveningness are used interchangeably. Thus, to summarise, if you are a morning type, you are more alert, awake and focused during the morning hours and your chronotype is morningness. If you are an evening type, you are more alert, awake and focused later in the day, often into the early hours of the evening, and your chronotype is eveningness.

According to Adan et al. (2012), the population distribution of chronotype among adults is 40% split between the two extremes of the chronotype spectrum (morning type or evening type), with 60% of the population being allocated to neither one of the two types. Other studies indicate that the extreme ends of the chronotype continuum receive the most attention, although the neither-types that are somewhere in-between the two extremes are most common. Most of the adult

population globally indicates either a normal distribution for chronotype or a distribution of predominantly neither-types (Henst et al., 2015; Kabrita et al., 2014).

Eveningness is discussed in terms of its characteristics and associated positive and negative attributes. The positive attributes of evening types are discussed first, followed by a discussion of their negative attributes. While the research discussed below focuses mainly on evening types, the research studies often compare morning and evening types in relation to the variables investigated; therefore a glimpse of morningness is also achieved by focusing on evening types.

In the literature (Orecjek et al., 2011, as cited in Stolarski & Jankowski, 2015; Roberts & Kyllonen, 1999), evening chronotypes are associated with somewhat higher intelligence. Roberts and Kyllonen (1999) state that evening types perform better than morning types on activities testing memory and processing speed, regardless of whether the tests were carried out in the early hours of the morning. The training-effects hypothesis provides a possible reason for the observed difference in the cognitive profiles of the two distinct chronotypes – the evening types and morning types – because the theory states that evening types have a regular need to work around the problematic areas of daily life, caused by the mismatch between work schedules and their preferred time of day. To surmount these problematic areas of daily life, evening types have had to develop greater problem-solving abilities (Preckel et al., 2011). An alternative reason could be that of cognitive profiles. According to this line of thinking, evening types have better cognitive function, resulting from their need for fewer hours of sleep, as more intelligent types have more effective neural recovery during sleep and therefore require less sleep (Geiger et al., 2010 as cited in Piffer et al., 2014). Other reasons for the difference in intelligence is rooted in evolution, but a discussion of this does not fall within the scope of the current research study.

In a meta-analysis among children and college students, a small yet significant pattern of correlation was found among eveningness and intelligence, as well as a negative correlation between eveningness and academic accomplishments. Table 2 indicates the strength of the relationships found.

Table 2

Strength of Relationships

Relationship	Strength of correlation
Eveningness and intelligence	r = 0.08
Eveningness and academic achievement	r = -0.16

Piffer et al. (2014) found age to moderate the relationship between eveningness and cognitive ability. The relationship strengthened as age increased. Evening types show a cognitive supremacy over morning chronotypes, despite morning types achieving better grades in the school setting. This finding has contributed to inconsistencies in intelligence research, as positive correlations typically are found between IQ scores and academic achievement, though evening types are the exception, with the exact opposite being found among them (Stolarski & Jankowski, 2015).

Evening types show low levels of both conscientiousness and future time perspective (Stolarski, Ledzińska and Matthews, 2013), which researchers argue could be an explanation the contradictory findings mentioned above. The inconsistency could also be caused by the sleeping patterns of evening types, as they prefer to go to sleep later that the average person, which leads to them being continuously tired and deprived of sleep as school start times are early. A final reason for the inconsistency could be the incongruity between times of peak performance of the evening type and the time of day during which society schedules tasks that require cognitive skills (May, 1999, as cited in Stolarski & Jankowski, 2015).

Although the abovementioned researchers found that evening types have lower academic achievements or performance despite being more intelligent, others have found high academic achievement among evening types. Piffer et al. (2014) built on the findings of previous research on chronotype, academic performance and intelligence by investigating eveningness in terms of the General Management Assessment Test (GMAT) scores among MBA students at the elite University of Chicago. The focus was on whether there was an association between eveningness and higher scores on the GMAT. The GMAT is regularly used to measure intelligence, as it tests general cognitive ability. The results found that evening types scored significantly higher than morning types . In totality, variables such as chronotype, sex and cortisol explained only 14% of the variance in GMAT scores. What this indicates is that the difference in cognitive performance between the different chronotypes is not a consequence of the difference in variables, such as number of hours slept or effort put into their studies, but rather an indication of a physiological

characteristic such as working memory, which affects the manner in which information is obtained, stored and retrieved (Piffer et al., 2014). Investigations of lateralisation in the information-processing system of people show that morning types attain higher scores in the left-thinking scale, while evening types scored higher in the right-thinking scale (Fabbri et al., 2007). Creative thinking ability was found to be linked more to evening types (Giampietro & Cavallera, 2007).

In conclusion, the research discussed above points to evening types being more intelligent than morning types. Noteworthy information to consider is that the studies discussed first were conducted using a sample group of schoolchildren, while the study by Piffer et al. (2014) used an adult sample of students studying towards a tertiary qualification that requires a higher level of intellectual capacity. Nevertheless, the study focusing on schoolchildren still provides valuable information, as academic achievement could be viewed as equal to performance in employed adults. The detrimental effects of a constantly tired and sleep-deprived workforce are that their performance is lowered, despite their higher intelligence and higher cognitive abilities. This scenario highlights the importance of finding a solution for employed evening types because, as indicated by Piffer et al. (2014), evening types have physiological reasons for their intelligence. This means that morning types would be unable to utilise strategies such as optimal sleeping and increased study efforts to imitate the intellectual capabilities of evening types. The problem faced by evening types in the workplace is solvable by addressing the sleep deprivation and fatigue caused by the mismatch between their optimal time of day and that of the organisation's time.

Evening types have also been shown to be creative. Giampietro and Cavallera (2007) highlight that evening types are creative and emotionally unstable, and have difficult social and familial relationships. Creativity is characterised by Guilford (1967, as cited in Giampietro & Cavallera, 2007) as the ability to create innovative solutions to problems. According to Guilford (as cited in Giampietro & Cavallera, 2007), creative thinking comprises two distinct parts – convergent and divergent thinking. Convergent thinking is the production of new information in response to a specific situation when trying to find the correct or superior answer. Divergent thinking is the exact opposite, where individuals attempt to produce new information and multiple possibilities. According to Guilford (1967, as cited in Giampietro & Cavallera, 2007) creativity is shown in divergent thinking through features such as originality, flexibility, fluidity and sensitivity.

The four features of divergent thinking are the basis for the Torrance Test of Creative Thinking (TTCT). The TTCT was developed from this definition of creativity and the test triggers the process of creativity through missing elements, sensitivity to problems and discordance. Within

the TTCT, each of the four features together and some other elements are defined as follows (Giampietro & Cavallera, 2007):

- Fluidity – the ability to produce hypotheses, new ideas and memories without taking into account the quality of the produced work. The flowing of thoughts increases the number of potential useful elements that can be used to solve the problem.
- Flexibility – a thinking pattern that enables the creation of strategies, exchange of ideas and ability to change between schemes, categories or chains of ideas with ease.
- Originality – the ability to find a statistically unusual and rare answer to an expression.
- Elaboration – the ability to develop a concept further by adding new elements.
- Sensitivity to problems – the ability to comprehend several aspects of a problem and, in doing so, establishing new links.

Giampietro and Cavallera (2007) hypothesised that individuals with lower scores on the reduced version of the Morningness-Eveningness Questionnaire (r-MEQ) and lower inclination towards morningness (i.e. indicating a stronger affiliation with eveningness) will have a stronger creative disposition.

The findings show that originality scores for evening types and morning types differ statistically significantly. Evening types also obtained significantly higher scores for originality, as shown by the Tukey post-hoc test ($F_{2\text{-}119} = 3.082$; $p < .05$). Other categories showed no statistical differences; however, evening types achieved higher scores on all other dimensions of creativity, such as originality, fluidity, elaboration and flexibility. The authors concluded that evening types are inclined to create many hypotheses, ideas and memories, leading them to change their conceptual strategy with ease. The leaning of the evening types towards originality, indicates their ability to control the stress of closure and created answers that are unique and unconventional without becoming too elaborate. During the scoring of the test, marks are only awarded when the answers are suitable and indicate creativity, in order to prevent answers from being too elaborate (Giampietro & Cavallera, 2007). It therefore can be concluded that evening types are better at divergent thinking than morning types (Giampietro & Cavallera, 2007).

The other functional distinction of creativity, that of convergent thinking, was researched by Simor and Polner (2017). According to them, evening types were previously suggested to be higher in creativity than morning types; however, the empirical evidence for this a link between chronotype and creativity is scarce and inconclusive. What complicates the research of creative thinking is that cognitive processes are influence by factors such as sleep and the time when the tests are

conducted. Simor and Polner (2017) therefore set out to investigate the convergent and divergent thinking abilities of the two chronotypes, while also considering the impact of asynchrony (optimal vs. non-optimal testing times) and sleep quality. The results of participants who completed compound remote associates (CRAs) were taken as data on convergent thinking, while the results for the just suppose subtest of the Torrance Tests of Creative Thinking were utilised for the data on divergent thinking. The sample group comprises an equal participation of evening types and morning types, with n = 36 for each group. A time interval that did (n = 32) or did not (n = 40) overlap with their individually defined peak times was used for the just suppose subtest. The findings indicate that chronotype was not directly linked to performance in terms of creativity; however, for convergent thinking tasks, a connection was found between chronotype and asynchrony. Evening types completing the test during non-optimal times had higher levels of performance than evening types who took the test during peak performance times, as well as morning types for both peak and non-peak times. Lower scores in convergent thinking were predicted by symptoms of insomnia, and the relationship between chronotype and asynchrony occurred regardless of the effect of general testing time or sleep quality. Chronotype, asynchrony or their interaction was found to be non-predictive of divergent thinking. In conclusion, the findings indicate that asynchrony potentially has a positive effect on convergent thinking, especially in evening types (Simor & Polner, 2017). This research indicates that evening types perform better on convergent thinking tasks than morning-type employees, even during non-optimal times of the day. This is indicative of the value that potentially could add to organisations.

Based on the theory of person-environment fit, it is likely that evening-type employees would be found in the knowledge-intensive work setting. The theory of person-environment fit is based on the assumption that individuals look for and create environments that enable them to manifest their traits. The degree to which individuals fit into their work environment has major consequences, such as performance, stress, job satisfaction, turnover and productivity, and the better the fit, the better the outcomes (Su et al., 2015). Eveningness is associated with enhanced creativity and innovative thinking, as well as slightly higher intelligence, and is therefore associated with improved problem-solving skills and greater cognitive functioning. In the literature it is also found that knowledge workers, or those employees working within a knowledge-insensitive work setting, are required to be creative and innovative, as well as able to solve complex problems (Reinhardt et al., 2011; Alvesson, 2004, as cited in Aghaz & Sheikh, 2016). It is proposed that evening types will be prevalent in the knowledge-intensive work setting, as these individuals will self-select into careers that require creativity, innovation and more cognitive input.

Knowledge workers are vital in the attainment of a competitive advantage for their organisations, and to this end are also required to be creative and innovative and solve complex problems. Given the proposal that evening chronotypes (who are known to be slightly higher in intelligence and highly creative) will self-select into knowledge work, organisations cannot afford to disregard the positive benefits of employing evening-types, as well as nurturing and protecting them.

However, evening types are not associated only with benefits for the organisation; they are also associated with various negative attributes that are discussed briefly below. These negative attributes include emotional intelligence (see Stolarski & Jankowski, 2015), life satisfaction (see Jankowski, 2012, 2015; Randler 2008a), temperament (see Jankowski, 2012) and depression (Stolarski & Jankowski, 2015). It is proposed that organisational practices that are accommodating of the needs of the evening type will lead to fewer of the negative attributes associated with evening types, leading to organisations getting the full benefit of their positive attributes.

Some of the negative qualities of evening types are associated with the mismatch between their chronotype and traditional working hours. Another negative quality of evening type is low life satisfaction. Randler (2008) suggests that the reason for the lower levels of life satisfaction of evening types could be social jet lag. However, the research findings indicate that dissatisfaction with life is produced by the morningness-eveningness continuum itself, and not the misalignment between social and biological time.

Social jet lag describes the misalignment between an individual's social and biological times (Jankowski, 2017). Wittmann et al. (2006) also indicate that, because evening types' sleep-wake cycles are not synchronised with social and work schedules, they experience affective disturbances. Tonetti et al. (2010) state that social jet lag could provide the answer to why evening-types are high on sensation-seeking and risk-seeking behaviour: they need to resort to risky behaviours to keep them on an adequate activation level to compensate for the sleepiness that results from social jet lag. More recently, Togo et al. (2017) set out to examine the associations between morningness-eveningness, depressive symptoms, rotating shift work and sleep duration by utilising a sample of Japanese nurses. They found that greater depressive symptoms were found in employees working shifts that rotate in comparison with those employees who only worked during the daytime; also, adult employees who did not engage in nightshift work and showed depressive symptoms are associated with chronotype and sleep duration. The results indicate that more evening-type employees were working shifts than doing day work. Furthermore, higher

levels of eveningness and shorter periods of sleep on shifts where employees worked during the day were related independently with greater levels of depressive symptoms (Togo et al., 2017).

It can be deduced from the above that some of the negative attributes of evening types are caused by the misalignment between their chronotype and traditional working hours. What this means for organisations is that these negative attributes can be addressed and potentially relieved by providing employees with more options to align their chronotype with their working schedules. Even as far back as in 1987, the concept of workplace flexibility was regarded as a strategy to allow employees more control over their work circumstances, such as where they work, when they work and how they work (Dunn et al., 1987, as cited in Gilmer, 2018). Organisations therefore have a vested interest in finding methods of increasing the positive attributes of evening-type employees, such as creativity and innovation, as these are known to be important in contributing to the attainment of a competitive advantage (Urbancova, 2013), but also for introducing interventions to counter the negative attributes associated with these evening types.

2.4.4 Resources

Resources (job and personal) related to the current study are discussed below. Workplace flexibility is discussed as a job resource, followed by conscientiousness as a personal resource.

2.4.4.1 Job resources: Workplace flexibility

Flexibility as a concept has become popular in discussions of new organisations in the twenty-first century. Turbulent environments are created due to increased global competition, expanding customer expectations and accelerated technological change. Flexibility is a method that allows organisations to manage the growing uncertainty, because it enables a rapid response (Martinez Sanchez et al., 2007). Other researchers have stated that, due to the tougher climate in which companies need to operate, organisations need to be more flexible or utilise more flexible workplace practices to be successful (Gittleman et al., 1998, as cited in Martinez Sanchez et al., 2007). Information and communication technologies have enabled work to be more portable and ubiquitous, resulting in employees being more flexible in organising their work (Moen, 1996, as cited in Martinez Sanchez et al., 2007).

Workplace flexibility recently has been promoted in the literature, given that it appears to be one of the best strategies to utilise in order to deal with the challenges and demands of working life in the modern age (Baum & Young, 1973, Golden & Figart, 2000 and Hörning et al., 1995, all cited

in Costa et al., 2006)). Having flexibility in hours worked unavoidably leads to alterations in the duration of the work shift and total working time, and gives rise to more varieties in schedules and the amount of night work, which potentially could affect the family, social and health aspects of people's lives. There are various types of flexibility and various approaches to each that can be selected as opposed to standard working times (Härmä, 2006). The first type of flexibility is that company-based flexibility. In this type of flexibility, the working hours indicate the needs of the organisation to either alter, extend or decrease work hours to be in line with various business needs to fit the client or production (Costa et al., 2001). The second type of flexibility is individual flexibility. This type refers to the needs of employees and enables employees to have autonomy over various aspects of their work, such as breaks, start and end times, vacations, off days and the number of work hours (Costa et al., 2001).

Workplace flexibility practices therefore are extremely valuable for knowledge workers, as these employees' performance is evaluated predominantly on outcome rather than process and allows for more control over the work process (Woolley, 2009). This therefore means that knowledge workers have to deliver projects and are evaluated on the merit of their delivery, regardless of the constraints, time allocated, or hours worked to finish the project. Knowledge workers are also exposed to constant demands, as they are required to generate innovative solutions on a continuous basis, experience more emotional and mental stress and are expected to do more on a continuous basis (Alvesson, 2004, as cited in Aghaz & Sheikh, 2016).

Taking into account the proposition that evening types will self-select into jobs in the knowledge-intensive work setting, the concept of workplace flexibility becomes even more relevant to include in the current research study. As discussed in section 2.4.3, evening types are more creative and slightly higher in intelligence, making them beneficial to have within the knowledge-intensive work setting as they are employed for their thinking and are required to be creative, innovative and solve complex problems on a continuous basis. Studies also indicate that individuals asked to perform tasks at times that are misaligned with their chronotype perform poorer than those who perform tasks at more optimal times of the day (Carciofo et al., 2014; Goldstein et al., 2007; van der Vinne et al., 2015; Vetter et al., 2012, as cited in Gilmer, 2018). Researchers state that forcing evening types to be productive at suboptimal times of the day results in their cognitive abilities not being realised fully (Smarr & Schirmer, 2018). Using flexible working arrangements has also been shown to lower stress and burnout (Grzywacz, Carlson and Shulkin, 2008) and increase productivity (Pruchno et al., 2000, as cited in Gilmer, 2018; Shepard et al., 1996, as cited in Gilmer, 2018). It therefore is suggested that organisations should take chronotype into account when

striving for a competitive advantage and provide employees with the flexibility to arrange their working schedule accordingly, which will result in optimal performance by these employees. The organisation therefore will get more out of their employees if it incorporates workplace flexibility.

Two types of workplace flexibility exist: perceived workplace flexibility and actual workplace flexibility. The first is an employee's personal assessment of whether they have sufficient access to flexibility to satisfy their current needs (Civian et al., 2008). Actual workplace flexibility is defined by the Center on Aging & Work (n.d., as cited in Pitt-Catsouphes & Matz-Costa, 2008) as providing supervisors and their reportees with opportunities, options, choices and regulations regarding when the employee works, where the employee works, how the employee works and how much the employee works. Perceived and actual workplace flexibility are distinct yet closely connected constructs that influence each other. A paper by Boonzaier et al. (2001) mentions that studies done by Fried & Ferris, 1987 indicated that the objective manipulations of jobs (such as in the case of workplace flexibility) leads to alterations in the perception of the jobs by the workers. The utilisation of subjective job characteristics is supported by empirical investigation. Hackman and Oldham (1976) are of the opinion that, when attempting to forecast or understand the behaviour of employees in the work context, it is better to use employee ratings of job characteristics rather than objective ratings, as employee ratings include the perception of the job that serves as the driver for the reaction to it. Boonzaier et al. (2001) stated that the subjective ratings of employees are valid and sufficient indicators of the objective job characteristic present in the job. Their research provides valuable insight for the current research study, as it means that research conducted on actual workplace flexibility and perceived workplace flexibility can be used interchangeably. Research conducted on actual workplace flexibility informs about perceived workplace flexibility and research on perceived workplace flexibility provides an indication of actual workplace flexibility. If applying the research findings to the current study, it can be said that objective amounts/changes in amounts of workplace flexibility (actual workplace flexibility) that these employees receive would inform their perception of whether they have sufficient flexibility required to meet their current needs (perceived workplace flexibility).

According to Jones et al. (2008), there are differences between using flexibility options and having flexibility. Kossek et al. (2006) state there is a difference between the effects of used workplace flexibility and perceived workplace flexibility on outcomes that are personal and marriage-family related. Utilising workplace flexibility choices can be advantageous for employees, and research has shown that employees can obtain value from workplace flexibility without making use of the option per se (Jones et al., 2008). The mere existence of workplace flexibility therefore has

beneficial effects for employees. Similarly, the perception that options for flexibility are available to employees is associated with positive outcomes, as shown by Frone and Yardley (1996, as cited in Jones et al. 2008) and Hill et al. (1998, as cited by Jones et al., 2008). Kossek et al. (2006) found that greater perceived flexibility by employees leads to significantly lowered levels of depression, work-family conflict and job turnover intentions. Research conducted by Hill et al. (2001) came to similar findings, in that IBM employees with more perceived flexibility reported more work-family balance. The employees also reported that they managed to work an additional eight hours before reporting work-family conflict in comparison to employees with less perceived flexibility (Hill et al., 2001).

Evidence connecting workplace flexibility to health-related outcomes of employees are conceptually and empirically underdeveloped (Grzywacz et al., 2008), however, research linking employee's perceptions of flexibility regarding their schedules and health-related outcomes are more developed and consistent (Grzywacz et al., 2008). The research by Galinsky et al. (1996), Halpern (2005) and Janssen and Nachreiner (2004) shows that fewer physical symptoms and reduced levels of burnout and distress are reported if there is greater perceived schedule flexibility. Thomas and Ganster (1995) state that greater control in the perception of schedule, together with lowered levels of conflict between the dimensions of work and family, are mediating factors in some of the relationships between flexibility and health-related concerns. More specifically, they show that higher levels of perceived schedule flexibility are related to better self-reported cholesterol levels. Overall, it has been found that employees perceiving that they have the necessary flexibility to meet their needs report better health (Grzywacz et al., 2008).

A longitudinal study found a relationship between perceived schedule control and less objectively assessed sickness absences (Ala-Mursula et al., 2004). Similarly, Casey and Grzywacz (2008) discovered a relationship between perceived schedule flexibility and less sickness absences and work-related impairment. Thus, the abovementioned research indicates that employees who perceive that they have sufficient flexibility in their jobs report better health. However, it has to be taken into account that the actual research connecting both perceived and actual workplace flexibility to employee health is scarce (Grzywacz et al., 2008).

Flexible workplace practices are associated with many positive and negative outcomes. Costa et al. (2006) argue that the increased implementation of individual-based flexibility will lead to better health and work satisfaction for employees, while the presence of company-based flexibility will increase the negative outcomes. Similarly, meta-analytic studies highlight favourable outcomes –

both individual and organisational – as a consequence of workplace flexibility. Individual and organisational outcomes that are beneficial include higher levels of job satisfaction and productivity, and lower employee turnover intention (Baltes et al., 1999; Gajendran & Harrison, 2007). Hyman and Summers (2004) explain the positive effect associated with workplace flexibility on job satisfaction by highlighting that employees who have the opportunity to choose experience positive effects on job satisfaction. These results are similar to those of researchers such as Baruch (2000), who found that remote working leads to higher levels of job satisfaction. Remote working has also been found to be related to increased autonomy (Kelliher & Anderson, 2008). Another positive consequence for the organisation is an increased ability to attract and retain talented employees (Branine, 2003; Rau & Hyland 2002), and to experience reduced absenteeism (Dalton & Mesch, 1990), with greater employee commitment and loyalty as positive outcomes (Roehling et al., 2001). Another positive outcome of workplace flexibility for the employee is better work-family balance (Halpern, 2005). Halpern (2005) states that the changing family dynamics in the 21st century leads to family responsibilities affecting the work responsibilities of the employee, and work arrangements should be put in place to assist and accommodate employees to meet their family responsibilities so that they can still perform at a high level.

Cooper and Kurland (2002) say feelings of isolation resulting from remote work leading to reduced job satisfaction are examples of negative outcomes associated with flexible workplace practices. Further potential negative consequences of flexible workplace arrangements are encountered in the study by Leonardi et al. (2010). They use distributed work arrangements as a modern term for the workplace flexibility concept. Their study was based on the premise that information and communication technologies (ICTs) offer teleworkers connective capabilities, which means that they no longer needed to be bound to an office space/place of work. This was intended to be beneficial to these teleworkers, but also resulted in the perception by others that these individuals are available at all times due to constant connectivity. This results in a paradox for teleworkers, as the potential benefit of distributed work affects them negatively by the very same technology that made the distributed working arrangements possible. Leonardi et al. (2010) aimed to provide threefold insights: firstly, to investigate teleworkers' experiences as a connectivity paradox; secondly, to explore the strategies teleworks use to manage the paradox and, finally, to explore whether concomitant behaviours result in organisational change.

The study was a qualitative study and consisted of thirty-six research participants divided into four groups. The first group consisted of flexiworkers (n = 14), described as individuals who divide

their time between their home, workplace or satellite locations. The second type of participants were fixed workers (n = 11) and consisted of individuals who work exclusively from home or a satellite location. Mobile workers (n = 4) were individuals who travelled to various sites during the workday and, finally, distributed workers (n = 7) were individuals who worked in one office building but engaged primarily with individuals at a different location. The participants were also from various industry sectors, including computer services (n = 8), education (n = 3), finance (n = 1), media (n = 2), public relations (n = 9), publishing (n = 3), software (n = 4), telecommunications (n = 5) and web services (n = 1). Leonardi et al. (2010) used the snowball method to obtain participants, starting off by gathering participants from companies that supported distributed work arrangements.

Results relating to flexibility indicated that 47% of the participants indicated that they believed an improved work-life balance would be obtained if more flexibility was possible in their schedules. The data also show that the teleworkers learned over time that the distance between them and their offices/colleagues did not allow them full flexibility with regard to their work schedules, as their day was controlled primarily by whether or not they needed to be available for work. A total of 36% of participants indicated that the lack of control and flexibility they experienced resulted from the effortlessness of communication with the office. One participant, Grant, stated that "part of the problem is that you're on email all the time and there is a norm that you have to answer it quickly, so people just email you all the time and want things" (Leonardi et al., 2010, p.94). Other participants mentioned similar concerns with regard to their instant messaging (IM) tools, indicating that the status indicators on the tool told other individuals whether they were online or not and, if they were, colleagues or clients would send messages that were unanticipated, and these messages would disrupt the participants' plans and schedules that they had made prior to being away from their desks for personal reasons. These unanticipated messages resulted in the participants having to cancel their pre-arranged schedules and plans to attend to work matters. These disruptions consequently resulted in participants choosing not to schedule flexible time in advance, due to the possibility that they could be contacted and asked to do more work, which would disrupt their pre-scheduled flexible time (Leonardi et al., 2010). This research highlights the sometimes overlooked disadvantages of workplace flexibility; however, for the current study, the advantages of these workplace flexibility practices was the main focus.

While workplace flexibility may have its disadvantages in addition to its benefits, it was expected that workplace flexibility in the light of the current research study and the demands on knowledge workers would serve as a resource for these employees and provide them with the autonomy to

schedule their day in order to achieve optimal performance, balance in their work and family responsibilities and – with regard to their work – be more engaged and less prone to burnout.

2.4.4.2 Personal resources: Conscientiousness

Personal resources are resources that are located within the individual and are valuable for their inherent nature (e.g. self-esteem, hope and optimism) or can be utilised by the individual to obtain a goal that is valued greatly and is external to the individual (Hobfoll 2002). Personal resources are components of the self that are connected to resilience and refer to one's capacity to regulate and affect one's environment fruitfully (Hobfoll et al., 2003). Therefore, Demerouti et al. (2001) state that personal resources enable one to achieve goals, protect one from threats and their accompanying physiological and psychological effects, and finally, encourage personal growth and development.

Conscientiousness is defined as the tendency of individuals to be organised, dependable, purposeful and achievement oriented (Perrewé & Spector, 2002, as cited in Zellars et al., 2006). Highly conscientious individuals are often known for their diligence, ability to persevere, efficiency, hardworking approach to work and ambition (Digman, 1990, and McCrae & John, 1992, as cited in Zellars et al., 2006). Conscientiousness has also been associated with numerous positive outcomes and is considered a resource that significantly influences employees' behaviour at work. Various other definitions of conscientiousness are found in Opie and Henn (2013), such as the definition provided by Taylor and De Bruin (2006, as cited in Opie & Henn, 2013), who describe conscientiousness as the extent of effectiveness and efficiency that an individual has towards their planning, organising and engagement in tasks, while Maltby et al. (2010, as cited in Opie & Henn, 2013) and Taylor and De Bruin (2006, as cited in Opie & Henn, 2013) describe conscientiousness as the extent to which employees are able to discipline themselves, be controlled, exert effort, have a need for achievement, require and maintain order and act dutifully.

Conscientiousness fits this description of a personal resource perfectly when looking at its definitions of being dependable, purposeful, achievement-orientated and organised, which results in employees being able to meet their work targets and perform at a satisfactory level and therefore reducing potential threats and, most importantly, helping them to achieve work goals. This is in line with the reasoning of other researchers, who argue that, according to COR theory, conscientiousness protects employees from stress. The empirical study by Zellars et al. (2006) made use of conscientiousness as the personal resource; however, their study does not fall within scope of the current research study.

The inclusion of conscientiousness in the current study was founded upon the meta-analysis conducted by Barrick and Mount (1991). The meta-analysis investigated the relationships between the big five personality dimensions, three job performance criteria (training proficiency, job proficiency and personnel data) and five occupational groups (police, sales staff, professionals, managers and skilled/semi-skilled workers). The results of the meta-analysis indicated that the only personality dimension that were consistently related to all job performance criteria among all occupational groups was conscientiousness (*p* ranges from .20 to .23 for all criterion types and *p* ranges from .20 to .23 for all five occupational groups and is noticeably larger than for other personality dimensions). Conscientiousness was also the only personality dimension that was a consistent valid predictor of all occupational groups and criterion types, thus indicating that conscientiousness unlocks other traits that are important to accomplish work tasks in all jobs. Employees who display other traits associated with a strong sense of purpose, obligation and persistence generally perform better in their jobs than employees who do not exhibit these traits.

The conscientiousness dimension is of particular importance for the current research study, especially within the context of all the occupational groups mentioned, except for skilled/semi-skilled occupations, as these are outside the scope of knowledge workers (see criteria for knowledge workers in Section 1). The findings of the meta-analysis therefore indicate that conscientiousness is an important predictor of the job performance of knowledge workers and, given the role of knowledge workers in the search for obtaining a competitive advantage, conscientiousness was included as a variable in the current research study.

2.4.5 Job demand: Work overload

Work overload by definition relates to the quantity of work and includes both emotional and mental load (Rothmann et al., 2006). Jex (1998, as cited in Shirom et al., 2006) defines work overload differently – as the employee's subjective perception that more work has been designated to them than they could complete in a specified amount of time.

Two sets or types of work overload (quantitative and qualitative), as originally defined in the study by French et al. (1982, as cited in Kuschel, 2015), are provided:

- Quantitative overload: Occurs when the amount of work for an employee to complete is more than what is possible within a given amount of time.
- Qualitative overload: Occurs when the employee in the role does not have the knowledge and skills required to complete the work within that role.

In the literature, conditions of work overload and reduced amounts of time to complete work tasks have been said to be the most common demand within the work setting of employees (Moore, 2000). Work overload is also commonly found to be associated with burnout. According to Zubairi and NoorDin (2016), dissatisfaction with workloads is also one of the main contributors to burnout amongst professionals.

Given the increase in market competition and dynamically changing work environments, work overload has become a common issue within the workplace, and almost all employees are suffering from it. Work overload typically leads to poor health conditions as well as poor mental circumstances. These consequences become a threat to the organisations within which these employees work because of their poor performance and lack of ability to maintain standards. Employees required to complete large volumes of work in a targeted time become stressed by both their work and their organisation, and the motive of their job turns into achieving targets and therefore diminishes creativity (Altaf & Awan, 2011).

The above statements regarding work overload and its detrimental consequences for both the employee and the organisation provide insight into its effects on an organisation's ability to obtain an advantage over the competition. Furthermore, focusing specifically on the context of the current research and given that knowledge workers are said to be vitally important to an organisation's ability to strive for a competitive advantage, the negative consequence of work overload, viz. diminished creativity, is particularly concerning (Altaf & Awan, 2011). Knowledge workers' overload could potentially originate from the continuous demand on them to be creative and innovative (Alvesson, 2004, as cited in Aghaz & Sheikh, 2016), which makes them experience more emotional and mental stress.

Based on the classification and examples of knowledge workers provided in the article by Figurska (2015a), the discussion below includes empirical research conducted on employees who can be considered to be knowledge workers.

Rothmann et al. (2006) found statistically significant higher scores for the work overload among engineers as opposed to employees working in the insurance industry. Less work overload was experienced by correctional officers than by insurance employees and by university or technology and academics employees in higher education institutes. Correctional officers therefore experienced the lowest levels of work overload of all the occupations mentioned. Engineers and academics in higher education experienced the highest levels of work overload out of all the occupations investigated; however, engineers also experienced the highest scores for growth

opportunities of all the occupations evaluated. According to Rothmann et al., (2006), the combination of job demands in the form of high work overload, together with the resource of high growth opportunities, possibly make the profession of engineering challenging, rather than stressful.

With regard to growth opportunities, academics in higher education institutions were found to have the most growth opportunities out of all the groups, while correctional officers had the lowest opportunities for growth. These findings by Rothmann et al. (2006) are in line with those of Koorts (2000) and Fisher (1994) (as cited in Rothmann et al., 2006) and Nixon et al. (2001). The perception that a job in academia is challenging might be a result of the potential for growth, such as variety, autonomy and learning opportunities, that are inherent in this type of profession (Rothmann et al., 2006).

Studies among academic staff in the United Kingdom indicated that the major stressors in the education industry are unmanageable workload, lack of support in completing paperwork and administration, and poor communication systems (Earley, 1994, as cited in Kinman (2001). All these challenges result in an increasing workload because of increasing student numbers, adult learning and globalisation (Blackmore, 2001; Shortlidge, 2003). In combination with reduced job security and pay, these stressors result in lower job satisfaction and higher intention to quit (Kinman & Jones, 2003).

Rothmann et al. (2006) found that teachers in South Africa experienced the highest work overload compared to engineers, correctional officers and insurance staff. It is known that work overload occurs when employees have too much to do in a timeframe that is too short to complete the requirements and when a shortage of resources is experienced. Increasing workload has been shown to have a consistent positive relationship with burnout in the burnout dimension of emotional exhaustion (Cordes & Doughtery, 1993 and Schaufeli & Enzmann, 1998, as cited in Rothmann et al., 2006). The relationship between work overload and burnout arises because work overload is responsible for the depletion of employees' capacity to meet the demands faced in their jobs, with the critical aggravator of being unable to recover from their work demands (Landsberhis, 1998, as cited in Rothmann et al., 2006). A sustainable workload is one that provides employees with an opportunity to utilise and refine their existing skills, while also allowing them to become effective in new areas of their work. In conclusion, a sustainable workload therefore should stop the cycle of exhaustion that fuels burnout (Leiter & Maslach, 2003). Studies in the South African context (see Pretorius, 1994, as cited in Rothmann et al., 2006; Storm & Rothman, 2003) have

found that burnout is related to job demands and therefore justifies the investigation of whether work overload leads to burnout.

2.5 The relationships between latent variables

In the section below, the direct relationships in the conceptual model, as depicted in Figure 1, are discussed.

2.5.1 Chronotype and burnout

The study by Mokros et al. (2018) focuses on assessing whether sleep quality and chronotype could be regarded as predictors of a sense of burnout in a sample group of physicians and nurses at a district hospital in Central Poland. Burnout was measured using the Link Burnout Questionnaire (LBQ), which measures burnout in four dimensions: psychophysical exhaustion, relationship deterioration, sense of professional ineffectiveness and disillusionment. Chronotype was measured using the Chronotype Questionnaire (CQ). They found that eveningness predicted psychosocial exhaustion to a greater degree than morningness, and that sense of professional ineffectiveness and relationship deterioration were also reduced for evening types. The findings of this study therefore match those of other research on the association between burnout and chronotype, although very little such research exists. Mokros et al. (2018) conclude that chronotype should be considered a salient risk factor for burnout that could act as a starting point for further development of the association and lead to behavioural interventions aimed at preventing burnout.

More recently, Mokros et al. (2019) set out to investigate whether chronotype and social jet lag predict burnout among physical therapists and found that these variables only predict burnout if considered together. More specifically, evening chronotype and high social jet lag predicted more severe levels of burnout. Eveningness predicted high levels of psychosocial exhaustion, but only when social jet lag levels were high. Interactions were observed between morningness-eveningness, therefore the relationship between social jet lag and burnout cannot be confirmed or rejected. Two interesting findings form the basis of this outcome: firstly, it was found that increases in social jet lag predicted a reduction in psychophysical exhaustion as well as a sense of professional ineffectiveness, which was observed in the testing of the possible interactions between morningness-eveningness and social jet lag. Secondly, the only predictor of sense of professional ineffectiveness found in the tested model was social jet lag (Mokros et al., 2019). The reasoning for the existence of a relationship between chronotype and burnout syndrome is based on the

findings that a preference for late chronotype is a well-known risk factor for depressive symptoms, which could be attributed to the evening chronotype's predisposition for desynchronising their biological and social circadian rhythms. Given the suggested overlap between affective disorders and burnout (Bianchi et al., 2015), similar reasons can be deduced for the relationship between chronotype and burnout. Recent findings on social jet lag seem out of place in terms of the earlier research, which found that evening and intermediate types experience higher levels of burnout than morning types, regardless of their mental symptoms; however, this model did not include social jet lag or shift work (Merikanto et al., 2016). According to Stolarski and Jankowski (2015), late chronotypes are also associated with high ability-based emotional intelligence, which serves as a protective factor against burnout. These findings may provide an explanation or why eveningness was associated with reduced psychophysical exhaustion regardless of the other factors analysed.

Bellicoso et al. (2014) set out to explain what affect chronotype and sleep quality have on feelings of burnout among oncology nurses working dayshift schedules. Morningness-eveningness was measured using the Horne-Östberg Morningness Eveningness Questionnaire, while burnout was measured using the Copenhagen Burnout Inventory. Explanations for the connection between chronotype and burnout were given in terms of sleep quality. According to Karagozoglu and Bingöl (2008, as cited in Bellicoso et al., 2014), work schedules that are constantly mismatched in terms of the employee's chronotype induce stress, which negatively affects their sleep quality. In turn, sleep quality that is suboptimal, and the corresponding fatigue, make it increasingly difficult to engage in daily activities and work tasks. Among to the Brand et al. (2010, as cited in Bellicoso et al., 2014) and Vela-Bueno et al. (2008, as cited in Bellicoso et al., 2014), sleep debt among nurses leads to stress, irrespective of the high-stress situations they encounter on a daily basis. It also leads to a feeling that is collectively known as burnout, including feelings of weariness, extreme emotional and physical fatigue, reduced cognitive functioning and exhaustion.

The findings of the Bellicoso et al. (2014) study indicate that nurses with a greater predisposition towards evening type or intermediate type chronotypes and/or poor sleep quality experienced significantly higher levels of burnout, including work-related, client-related and personal burnout, compared to participants with a morning predisposition and/or good sleep quality. Their findings further indicate that work stressfulness is another contributor to heightened levels of burnout (Bellicoso et al., 2014). The authors conclude that working during times of the day that are optimal to your individual preference, as well as sleeping well, contribute to decreased burnout. They say that employees' chronotype and sleep quality should be taken into account when setting up work

schedules in order to decrease burnout and enable optimal performance, while potentially increasing the retention of employees, and improving the quality of patient care and satisfaction. Bellicoso et al. (2014) noted that individuals with work schedules that conflict with their chronotype often sacrifice adequate sleep for work, either out of necessity or voluntarily. Inadequate sleep results in poorer sleep because of shortened sleep, going to bed at times misaligned with an individual's chronotypic needs, and sleeping at times when an individual typically should be awake and functioning. While it is possible that other personal and environmental factors also underlie the significant differences in burnout, allowing nurses to begin work at times that are slightly modified to accommodate their chronotypic needs may improve their sleep situation and quality and reduce their personal, work-related and client-related burnout (Bellicoso et al., 2014).

Similarly, the research conducted by Randler et al. (2015) set out to assess morningness-eveningness in teachers, focusing specifically on its relationship with sense of coherence and burnout. The sample consisted of 177 primary school teachers and the Composite Scale of Morningness (CSM) was used to assess morningness-eveningness, while the Maslach Burnout Inventory was used to measure burnout. Morning chronotype teachers were found to have reduced levels of emotional exhaustion ($r = -0.155$, $p < 0.05$). The findings with regard to emotional exhaustion are important, as emotional exhaustion is considered in the literature as the most predictive dimension of teacher burnout (Peeters & Rutte, 2005) and is often indicated as a symbol of burnout (Schaufeli, 2006) in the literature. Randler et al. (2015) found morningness to be more positively related to personal accomplishment. The research by Randler et al. (2015) indicates that morningness serves as an important predictor of well-being among teachers.

Similar findings have been found in research on young adults conducted by Merikanto et al. (2016), who found that eveningness is associated with high incidences of burnout compared to morningness ($\beta = 0.4$, $p < 0.05$).

The studies discussed above provide evidence of a relationship between chronotype and burnout. It is hypothesised that this relationship will also be found among knowledge workers, and various suggestions could be made for why it exists. Firstly, burnout is a common phenomenon among various occupational groups and there is no evidence to suggest that knowledge workers would be exempt from experiencing this phenomenon. Furthermore, it has been argued that a high distribution of evening chronotypes would be found in a sample of knowledge workers. It therefore could be said that the evening chronotype knowledge worker would be faced with the dilemma of

choosing to work during times of the day that are suboptimal to their chronotype. This would result in potentially less-creative and innovative work, which in itself would cause high stress levels, as these individuals are expected to perform at their peak on a constant basis. Alternatively, evening chronotypes could involuntarily be working both their standard working hours as well as in the evenings, when they are able to function optimally, resulting in longer working hours and hence less time for leisure activities. This, in turn, would result in less sleep and, consequently, reduced sleep quality. Ultimately, these aspects would lead to increased stress, resulting in burnout (Bellicoso et al., 2014). Given the abovementioned reasons, it is hypothesised that morning-type knowledge workers will have low levels of burnout, while evening-type knowledge workers will have high levels of burnout. Given that chronotype is measured in terms of morningness, it is proposed that chronotype has a significantly negative relationship with burnout.

Hypothesis 1: Chronotype has a significant negative relationship with burnout.

2.5.2 Conscientiousness and chronotype

Various researchers have found a correlation between chronotype and conscientiousness, as discussed below. Firstly, research conducted by Duggan et al. (2014) found that high conscientiousness (r = .35) was correlated with morningness, thus individuals high in conscientiousness are likely to be morning-oriented individuals. Similarly, the results of the study by Ruffing et al. (2015) show that morningness is positively correlated with conscientiousness (r = 0.38) and eveningness has a negative correlation with conscientiousness of (r = -0.21).

Randler (2008, as cited in Stolarski et al., 2013) found that morningness correlated positively with conscientiousness even after controlling for age and gender separately. Proof has been provided that conscientiousness is the largest predictor of diurnal preference (r = .33) after controlling for most of the other variables that are believed to be related to the morningness-eveningness dimension (Hogben et al., 2007). According to Tonetti et al. (2009, as cited in Stolarski et al., 2013), conscientiousness is the most reliable among the big five factors in terms of its relationship with chronotype among studies in the modern literature. The relationship between chronotype and conscientiousness has been found to be so significant and repeatable that several researchers have utilised conscientiousness as a validation procedure for their chronotype measures (Stolarski et al., 2013).

Rothbart et al. (2009, as cited in Stolarski et al., 2013) provide suggestions for the reasons for the relationship between chronotype and conscientiousness, stating that temperamental effortful

control forms the foundation for conscientiousness in the Five Factor Model, and this trait is empirically confirmed to be the best personality correlate of chronotype. Temperamental effortful control is defined by Jones, Rothbart and Posner, 2002 (as cited in Rothbart 2002 p.1114) as "the ability to inhibit a dominant response to perform a subdominant response" or the "efficiency of executive attention, including the ability to inhibit a dominant response and/or to activate a subdominant response, to plan, and to detect errors". In essence, this means that morning chronotype individuals are better able to regulate their own emotions, thoughts and behaviour, while evening chronotype individuals are not as well equipped to do so.

Similar arguments have been raised by other researchers, such as Vollmer and Randler (2012), who argue that evening students have more individually oriented values, such as openness to change and self-enhancement, whereas morning types are focused on more socially-oriented values, such as conservation and self-transcendence. According to Jackson and Gerard (1996), morning types therefore likely are more willing to adjust to social norms and standards, while their evening counterparts are not. Morning types attempt to accept and follow societal rules, behaviour also exhibited by conscientious individuals. This might serve as a potential explanation for why morning types have an inclination to exhibit conscientious behaviour.

To conclude the discussion on the relationship between conscientiousness and chronotype, a meta-analysis indicated that conscientiousness continued to be the strongest personality predictor of morningness (average r = .29) across 20 independent samples (Tsaousis, 2010). Therefore, given the repeatability and significance of the relationship between conscientiousness and chronotype, it is hypothesised that conscientiousness levels will be high in morning chronotypes and low in evening-type knowledge workers, therefore conscientiousness will have a significant positive relationship with chronotype.

Hypothesis 2: Conscientiousness has a significant positive relationship with chronotype.

2.5.3 Conscientiousness and work engagement

Research by Kim et al. (2009) investigated job burnout and job engagement and the relationship of these two constructs with the big five personality dimensions. Job burnout and work engagement are often perceived to be two sides of the same coin; however, the findings of the study by Kim et al., (2009) indicate the contrary, that burnout and work engagement are distinct concepts determined by different personality dimensions. Of these personality dimensions, the most important predictor of burnout was found to be neuroticism ($r = .40$, $p < .01$), while both

conscientiousness and neuroticism predict work engagement. The most dominant personality trait influencing work engagement was found to be conscientiousness ($r = .37$, $p < .01$). Conscientiousness was positively linked to most of the engagement dimensions. It was argued that employees high in conscientiousness are characterised by a strong sense of responsibility, organisational skills and steadiness, and are increasingly likely to use their energy to complete work tasks, resulting in a strong sense of professional efficacy.

Similarly, a South African study by Mostert and Rothmann (2006) focused on whether job stress, personality traits and background variables could predict the work-related well-being of police members, with work engagement and burnout serving as measures of work-related well-being. The results specifically related to conscientiousness and work engagement indicated that conscientiousness predicted vigour and dedication among variables such as emotional stability and high stress. Conscientiousness and emotional stability also inversely predicted exhaustion and cynicism.

A recent study conducted by Janssens et al. (2019) is in agreement with the findings of the aforementioned researchers. Janssens et al. also found that conscientiousness was positively associated with engagement ($r = 0.336$, $p < 0.01$) and its three dimensions. According to Bakker and Albrecht (2018), the connection between personality and work engagement is largely unknown. However, Janssens et al. speculate that the reason for the relationship is based on engagement, referring to internal drives to achieve a set of goals (McCrae & Costa, 1987 and Costa et al., 1991, cited in Janssens et al., 2019) and conscientiousness may bring about work engagement as a result of internal motivational processes (Janssens et al., 2019).

Regardless of the reasons for this relationship, the two studies discussed provide the evidence required to propose that highly conscientious knowledge workers will have higher engagement levels, while knowledge workers low in conscientiousness will have low levels of work engagement. Thus, it is expected that conscientiousness will have a significant positive relationship with work engagement.

Hypothesis 3: Conscientiousness has a significant positive relationship with work engagement.

2.5.4 Conscientiousness and burnout

Mostert and Rothmann (2006) conducted research on South African police service staff as a sample group and discovered a relationship between conscientiousness and burnout. Burnout was

found to be best predicted by stress, low emotional stability and low conscientiousness (exhaustion; $\beta = -.18$, $p < .01$; cynicism; $\beta = -.28$, $p < .01$).

Another South African study, by Morgan and De Bruin (2010), investigated the relationship between the big five personality traits and burnout in university students. The study found that conscientiousness had statistically significant correlations with all three burnout constructs: emotional exhaustion ($r = -0.167$; $p < 0.01$), cynicism ($r = -0.229$; $p < 0.01$) and professional efficacy ($r = 0.444$; $p < 0.01$). Conscientiousness was correlated negatively with both emotional exhaustion and cynicism, but had a positive correlation with professional efficacy. The authors explain these results by referring to the qualities associated with conscientiousness, namely achievement-orientation, being organised, having problem-solving coping strategies, and being purposeful in one's actions (Bouchard et al., 2004; DeLongis & Holtzman, 2005; McCrae & Costa, 2006, as cited in Morgan & De Bruin, 2010). The students' high conscientiousness organise nature and purposeful behaviour could potentially account for their lower sense of being overworked, especially during examination periods. Students high in conscientiousness tend to work consistently, which results in having less work to do the day prior to an assignment or examination (McCrae & Costa, 2006, as cited in Morgan & De Bruin (2010); Zellars et al., 2000), while their counterparts who are low in conscientiousness tend to do the opposite, i.e. not working consistently, which leads to them inflicting serious risk on their education careers (Dahlin & Runeson, 2007, as cited in Morgan & De Bruin, 2010).

Based on the empirical evidence provided by the two research studies discussed here, it is proposed that highly conscientious knowledge workers will have low burnout levels, while knowledge workers low on conscientiousness will have high burnout levels.

Hypothesis 4: Conscientiousness has a significant negative relationship with burnout.

2.5.5 Workplace flexibility and work engagement

Pitt-Catsouphes and Matz-Costa (2008) hypothesised that employees who report having greater required flexibility are more engaged than employees who do not have the flexibility they need. Their results show that employees with the required flexibility are significantly more engaged, as opposed to employees across all age groups who do not have the required flexibility. Interestingly, employees with sufficient flexibility who are 45 years and older were more engaged than those younger than 45 ($\beta = 0.19$, $t = 4.20$, $p < 0.001$), and those aged 55 and older were even more engaged than the age group 45 and above ($\beta = 0.48$, $t = 7.35$, $p < 0.001$) while the relationship of

the age group 35 to 44 years for the relationship between workplace flexibility and work engagement were ($\beta = 0.08$, $t = 1.81$, $p < 0.001$). Similar trends were not found among those employees who did not have sufficient flexibility. The researchers concluded that having the required flexibility is a strong positive predictor of work engagement, especially among employees aged 45 and older.

Richman et al. (2008) investigated the effect of the relationship between perceived workplace flexibility and the existence of supportive work-life policies on employee engagement and expected retention within the organisation. In a previous nationally representative study conducted on mid-size to large organisations by Richman in 2006 (see Richman 2006), perceived flexibility and employees' ability to manage the demands of work and their personal lives was strongly linked to higher levels of engagement and expected retention. Two national studies focusing on access to flexibility and not perceived workplace flexibility had similar findings, viz. that greater flexibility is linked to greater productivity and effectiveness, better mental health and resilience, higher levels of job satisfaction and engagement, as well as lower turnover intention (Galinsky et al., 2004 and WFD Consulting, 2007, as cited in Richman et al., 2008). Research also found that even the existence of supportive work-life policies and workplace flexibility policies led to positive outcomes for the individual and the organisation (Richman et al., 2008).

In the empirical study by Richman et al. (2008), it was hypothesised that perceived workplace flexibility and supportive work-life balance policies would be positively related to employee engagement. Support was found for this hypothesis in that perceived workplace flexibility (estimated coefficient = 1.593, $p < 0.001$) and a supportive work-life balance policy (estimated coefficient = 2.382, $p < 0.001$) were each positively related to employee engagement.

Another hypothesis proposes that participants using occasional (informal) flexibility and formal (ongoing) flexible work arrangements will report more perceived flexibility, longer expected retention and greater employee engagement. The results show that those using either formal or informal flexibility are more likely to perceive that they have the flexibility they need compared to those who do not (90% and 95% vs. 73% respectively). Individuals with formal flexibility arrangements were also significantly more likely to report they had the needed flexibility compared to individuals who utilised informal flexibility (95% vs. 90%). Richman et al. (2008) concluded that the best predictors of employee engagement are perceived workplace flexibility and supportive work-life policies.

Richman et al. (2008) say that access to flexibility and using workplace flexibility are equivalent to perceived workplace flexibility in terms of their effects on work engagement. Therefore, any study investigating the use of workplace flexibility in relation to work engagement could be considered as relevant for the aim of the current research study.

The research by Timms et al. (2015) set out to investigate the use of flexible work arrangements and their relationship with work engagement, turnover intention and psychological strain among a sample of Australian employees. Data was collected at two time intervals 12 months apart. This study hypothesised that a supportive organisational culture would lead to increased utilisation of flexible work arrangements and high work engagement, and that the inverse would be found in cases of hindering organisational culture. The results show that there were negative relationships between hindering organisational culture (characterised by time expectations and negative career consequences) and the use of flexible work arrangements, although the relationship was small and non-significant. A positive relationship was found between the use of flexible work arrangements and work engagement at time 1, and a negative relationship was found at time 2, 12 months later. These findings contradict the research hypothesis, hence the use of flexible work arrangements leads to reduced work engagement as time passes. However, support was found for a negative relationship between using workplace flexibility and organisational hinderance. The results also found that work engagement levels were higher at time 2 than time 1, given that there was more awareness of flexible work arrangements. However, there was reduced use of flexible work arrangements.

In terms of understanding these conflicting findings, Dikkers et al. (2004, as cited in Timms et al., 2015) say that a hindering and supportive organisational culture could co-exist in employees' experiences. While companies may suggest flexible work arrangements to address certain problems, they might also convey to employees that those making use of such opportunities are not working long hours and are not committed, therefore not worthy of being considered for a promotion (Beauregard & Henry, 2009 and Kirby & Krone, 2002, as cited in Timms et al., 2015). Results indicating that 'not using flexible work arrangements' was a predictor of work engagement show that employees do not perceive using workplace flexibility as a solution to their work-life balance issues. It is proposed that employees perceive that not utilising the workplace flexibility arrangements available to them as a solution to their work-life balance problems will provide them with job security (perceived). While other employees choose to make use of such workplace flexibility arrangements knowing that it would be damaging to their future career and potentially their job security, which eventually results in reduced work engagement.

These arguments show the role that company culture plays in the relationship between workplace flexibility and work engagement. Overall, the argument for the relationship between workplace flexibility and work engagement stems from the job-demands resources theory (Bakker & Demerouti, 2007). Resources in the workplace counteract the negative effects of job demands. When employees are afforded the option of workplace flexibility, they gain resources in the form of being able to decide how work is done (Behson, 2005, as cited in Timms et al., 2015), thereby gaining control and autonomy as mechanisms to counteract negative job demands. However, as discussed above, other factors might also interfere with this fundamental logic of the relationship. Although the scope of the current study does not include company culture, it could be argued that knowledge workers are assessed on the outcome and quality of their work and their performance, and not on the number of hours worked or similar measures of performance. Therefore, it is expected that company culture would be more supportive of workplace flexibility, as the focus is more on the quality of the contribution they make to the company. Furthermore, considering the fundamental principles of job-demands resources theory, knowledge workers are known to have many job demands, and having workplace flexibility as a potential resource potentially could have positive effects on their levels of work engagement. Work engagement is essential for knowledge workers, as it results in the achievement of a competitive advantage. It therefore is expected that knowledge workers with higher perceived workplace flexibility will have greater levels of work engagement, while knowledge workers with low perceived workplace flexibility will have low levels of engagement.

Hypothesis 5: Workplace flexibility has a significant positive relationship with work engagement.

2.5.6 Workplace flexibility and burnout

According to Grzywacz et al. (2008), research linking workplace flexibility to outcomes related to health are both conceptually and empirically underdeveloped. The authors are also of the opinion that measurements tend to focus on the perceived experience of flexibility by employees. What follows is a summary of the evidence in the existing research by Grzywacz et al. (2008), Hill et al. (2008) and Kossek et al. (2015).

Hill et al. (2008) studied the relationship between perceived workplace flexibility, life stage and gender, and family-to-work conflict as well as burnout and stress. It was hypothesised that having the necessary workplace flexibility would negatively predict stress, family-to-work conflict and burnout. The results show that the hypothesis was correct, as perceived workplace flexibility significantly predicted less family-to-work conflict, stress and burnout.

The study by Grzywacz et al. (2008) went into more detail on perceived workplace flexibility and the health benefits of formal flexible working arrangements. It was hypothesised that employees participating in formal flexible work arrangement will report experiencing less stress and burnout than those individuals who do not (Hypothesis 1). The researchers were also interested to see which type of formal flexible working arrangement had the best results in terms of lowering burnout and stress levels (Hypothesis 1a). They also hypothesised that participants who joined formal flexibility arrangements would report more perceived flexibility than those who did not participate in flexible working arrangements (Hypothesis 2). Therefore, individuals who participate in flexitime will report more perceived flexibility than those who participate in compressed workweeks, in both compressed workweeks and flexitime, and those who do not participate in formal flexible work arrangements (Hypothesis 2a).

Support was found for Hypothesis 1, which states that employees in all types of formal flexible working arrangements (flexitime with a compressed workweek, flexitime only and compressed workweek only) reported less stress and burnout than employees who did not participate in formal flexible working arrangements ($r = -0.36, -0.20, -0.59$, $p < 0.001$). For Hypothesis 1a, it was found that, of all the types of formal workplace flexibility investigated, flexitime only had the best results in terms of lowering stress and burnout levels ($r = -0.59$, $p < 0.001$). Grzywacz et al. (2008) also found support for hypothesis 2, more specifically for hypothesis 2a, namely that participants with both flexitime and compressed workweeks compared to those with no formal flexible work arrangement were 2.28 times more likely to report that they had workplace flexibility (perceived workplace flexibility). Employees with flexitime were only 3.5 times more likely to report that they had workplace flexibility compared to employees who did not have any at all. Finally, employees with a compressed workweek only showed no difference in reporting their perceived workplace flexibility compared to employees with no workplace flexibility arrangements.

What these findings of Grzywacz et al. (2008) indicate is that, firstly, participating in any formal flexible working arrangements will result in reduced stress and burnout levels. However, having an arrangement with flexitime only will have the best result for lowering stress and burnout levels. When looking at employees' perceptions of workplace flexibility, having a flexitime only workplace arrangement will result in the highest reporting of perceived workplace flexibility (the amount of flexibility is sufficient to meet the needs of the employee), followed by flexitime and compressed workweek arrangements and, finally, compressed workweek only arrangements, which will not result in any effect on employee's perceived workplace flexibility.

According to Kossek et al. (2015), continuity within workplace flexibility enables employees to modify their work arrangements to accommodate temporary events or challenges that are not work related, such as the death of a relative, personal time or illness. Continuity in work policies related to flexibility includes sabbaticals and vacation/sick leave, which allows employees to maintain their employment while also managing family or other life demands. The benefits of continuity in flexibility arrangement includes reduced burnout among employees and reduced conflict associated with having to maintain a balance between work and life roles.

Given all the research discussed, it is hypothesised in the current study that workplace flexibility will have a significantly negative relationship with burnout in that knowledge workers who are high on perceived workplace flexibility will experience lower burnout levels than knowledge workers who have low perceived workplace flexibility.

Hypothesis 6: Workplace flexibility has a significant negative relationship with burnout.

2.5.7 Burnout and work engagement

The relationship between burnout and work engagement is discussed by referring to research studies conducted in the school context, followed by two studies going into more detail on the dimensions of burnout in relation to the dimensions of work engagement.

Salmela-Aro and Upadyaya (2014) studied the applicability of the demands–resources model in the school context. They found that the engagement levels of students were negatively predicted by burnout among students ($r = -0.38$, $p < 0.001$). The study also found that a year after experiencing burnout, the students' engagement levels were still negatively affected ($r = -0.30$, $p < 0.001$).

Research by Hakanen and Schaufeli (2012) investigated whether work-related well-being indicators like burnout and work engagement also have an effect on context-free well-being, such as depressive symptoms and life satisfaction. The authors also paid special attention to the causal direction. Findings from the study indicate that work-related well-being affects general well-being over time. Two dimensions of burnout, viz. exhaustion and depersonalisation, were also found to be negatively related to the vigour and dedication dimension of work engagement three years later, as well as four years after that (seven years later in total). It can be deduced that the burnout experienced by the participants depleted their resources and thus led to reduced energy for involvement in work activities.

Llorens-Gumbau and Salanova-Soria (2014) found that the two dimensions of burnout, exhaustion and cynicism, negatively predicted two engagement dimensions, vigour and dedication, over time. Leiter et al. (2013) provided insight into these findings in that exhaustion appears as a result of demands exceeding resources over time, while cynicism can be predicted by the presence of a lack of fairness. Depleted employees are then less energised to engage in work, while cynicism leads to individuals perceiving their work as less significant and therefore, become less dedicated to it.

From the findings it is clear that the academic literature suggests that the relationship between burnout and work engagement is significantly negative. As a result, it is hypothesised that a negative relationship exists between burnout and work engagement and that knowledge workers with high levels of burnout will have lower levels of work engagement, while knowledge workers with low levels of burnout will have higher levels of work engagement.

Researchers also believe that the Broaden and Build Theory provides evidence of this inverse relationship, as it states that the experience of positive emotions, such as engagement, leads to potentially experiencing more options to create resources and would result in fewer experiences of ill-being, such as burnout (Fredrickson, 1998).

In the current study, the existence of a significant negative relationship between burnout and work engagement is highlighted and forms the essence of testing the relationship between these two variables.

Hypothesis 7: Burnout has a significant negative relationship with work engagement.

2.5.8 Work overload and burnout

In the past, work overload has been shown to be a major predictor of burnout (Schaufeli & Enzmann, 1998, as cited in Shirom et al., 2006) and that it is commonly found among employees (Kahn & Byosiere, 1992, as cited in Shirom et al., 2006). Based on Maslach's conceptualisation of burnout, the burnout state occurs due to an enduring misalignment between person and a variety of dimensions, among which work overload is a prominent feature (Maslach et al., 2001). In the literature, work overload has been found to positively predict global burnout (Lee & Ashforth, 1996). When looking at this connection in more depth, Demerouti et al. (2001) found that work overload is mostly associated with the physical fatigue dimension of burnout and minimally associated with the other dimensions of burnout. The research findings of Lee and Ashforth (1996) and Demerouti et al. (2001) formed the basis for two hypotheses in the study of Shirom et al.

(2006) related to work overload and burnout. The findings indicate that work overload is a positive predictor of global burnout and physical fatigue (βs = .58; .30 respectively).

De Beer et al. (2016) investigated the mediating effect of burnout on the relationship between the symptoms of work overload and psychological ill-health over time. Data collection occurred over a three-year period, once every year, to provide input for T1, T2 and T3. Evidence was found that work overload during T1 predicted burnout at T2 (β = .14, 95% CI [0.05, 0.24]), which led to symptoms of psychological ill-health in T3 (β = .12, 95% CI [0.03, 0.22]), therefore indicating the mediational role of burnout in the relationship between work overload and symptoms of psychological ill-health. This provides evidence of a positive causal relationship over the three years and potentially evidence of a mediating effect. The mediating effect was found to be true based on evidence of no direct path between work overload at T1 and symptoms of psychological ill-health at T3. Indirect effects were found of .02 (95% CI [0.01, 0.04]) for work overload at T1 on psychological ill-health symptoms at T3 through burnout at T2, as well as evidence of an indirect effect of burnout at T2 between burnout at T1 and psychological ill-health symptoms at T3. of .05 (95% CI [0.01, 0.09]). Work overload is therefore the starting point for the health-impairment process and the researchers recommend that workload should be monitored to prevent employees from experiencing work overload in an attempt to avoid the progression to health impairment (De Beer et al., 2016).

De Beer et al. (2016) show that work overload has a positive relationship with burnout and this can have a serious progression to symptoms of psychological ill-health, such as psychological unwell-being and psychological distress. From the literature it is known that the key work factors linked to psychological ill-health and sickness absences are work pressure, long hours worked and work overload (Michie & Williams, 2003, as cited in De Beer et al., 2016). Psychological ill-health symptoms also lead to an increased possibility of even more undesirable organisational outcomes, such as turnover, reduced commitment and absenteeism.

According to Leiter and Maslach (2005), work overload is the driver of exhaustion, while exhaustion is the antecedent of burnout. Gryna (2004, as cited in Tiyte, 2014) is of the opinion that work overload occurs when job demands are high and surpass the time and resources available to successfully meet those demands. Therefore, work overload could potentially result in stress, which leads to burnout in cases where the requirements of the job are too high (Gryna, 2004, as cited in Tiyte, 2014).

Similar arguments for the relationship between work overload and burnout have indicated that both qualitative and quantitative overload contribute to employees' experiences of exhaustion due to depletion of their capacity to live up to the demands of the job. The critical point occurs when employees fail to recuperate from the work demands. It is argued that acute fatigue due to a difficult event such as completing deadlines or attending to crises will not result in burnout if the employee is able to recover during more calm and relaxed periods at work or at home (Shinn et al., 1984, as cited in Maslach & Leiter, 2008). Sustainable workloads provide employees the opportunity to utilise and perfect the skills they have and increase their effectiveness in new areas of work (Landsbergis, 1988, as cited in Maslach & Leiter, 2008).

According to the JDRM, the development of burnout follow two processes. Firstly, difficult parts of work, such as extreme job demands, result in continuous strain on the individual and eventually result in exhaustion. The second process is caused by a deficiency of resources, which obscures the individual's ability to meet job demands and results in further withdrawal behaviour. The long-term effect of the withdrawal behaviour is disengagement from work. It could be argued theoretically that the interaction between job demands and job resources is the most vital process in the development of burnout resulting from exhaustion and disengagement. However, little empirical evidence is found to corroborate such an interaction effect (cf. Hockey, 1993 as cited in Demerouti et al., 2001).

In the current research study, work overload was investigated as a job demand and burnout as the strain variable. From the literature on work overload and burnout, support is found for the two burnout-development processes of the JDRM.

Research by Ahuja et al. (2007) focused on perceived work overload and hypothesised that it will have a positive influence on the work exhaustion of IT road warriors. IT road warriors are IT consultants who work at distant client sites representing their employer, including overnight work, for most of their work week. These consultants work long hours to achieve their objectives before returning to their homes for the weekend. Work overload has been found to have a strong influence on work exhaustion (Moore, 2000) and this would apply to these IT road warriors, as they could become susceptible to burnout due to being overburdened. Support was found for the hypothesis stating that a strong positive relationship exists between perceived work overload and work exhaustion ($\beta = .43$, $p < .001$).

Given the abovementioned research, it is proposed that high work overload among knowledge workers will result in high levels of burnout levels, while low work overload will result in low levels of burnout.

Hypothesis 8: Work overload has a significant positive relationship with burnout.

2.6 Interaction Effects Between Latent Variables

2.6.1 Workplace flexibility as a moderator of the relationship between chronotype and burnout

No empirical studies could be found in the literature to support a moderating effect of workplace flexibility on the relationship between chronotype and burnout; however, a theoretical argument is proposed.

Evening chronotypes suffer from a misalignment between traditional working schedules and their chronotype. Bellicoso et al. (2014) suggest that allowing nurses to start work at a time that is slightly modified to better accommodate their chronotype could reduce the amount of burnout experienced. This suggestion could be viewed in the context of workplace flexibility, which has the potential to modify the working hours and schedule to accommodate better alignment between working schedule and chronotype. This, in turn, potentially could result in reduced levels of burnout, specifically for individuals with a propensity for eveningness. While this suggestion is targeted specifically at nurses, it is proposed in the current study that it could be generalised to the wider population of knowledge workers. It therefore is proposed that workplace flexibility will moderate the negative relationship between chronotype and burnout in that employees at the lower end of the chronotype scale (i.e. more predisposed to eveningness) will experience less burnout in the presence of workplace flexibility.

Hypothesis 9: Workplace flexibility buffers the relationship between chronotype (eveningness) and burnout.

2.6.2 Workplace flexibility as a moderator of the relationship between work overload and burnout

Interaction effects were also applied and tested in the current research study, as postulated in propositions 3 and 4 of the JD-R theory. Bakker and Demerouti (2017) suggest that future research could model the moderators of the job demands-resources relationships. The current study focuses on exploring whether the interaction effects contained in the JD-R theory hold true for the specific

latent variables in the study. In the absence of reported data on the moderating effect of workplace flexibility specifically on the relationship between work overload and burnout, the interaction proposition 3 of the JD-R model was investigated in order to contribute to the nomological network and body of knowledge.

Hypothesis 10: Workplace flexibility moderates the relationship between work overload and burnout such that the relationship is weakened.

2.6.3 Work overload as a moderator of the relationship between workplace flexibility and engagement

Similarly, the study explored the moderating influence of work overload on the relationship between workplace flexibility and work engagement, in line with proposition 4 of the JD-R model, which suggests that job resources are particularly instrumental in influencing motivation when job demands are high. The final hypothesis is consequently formulated.

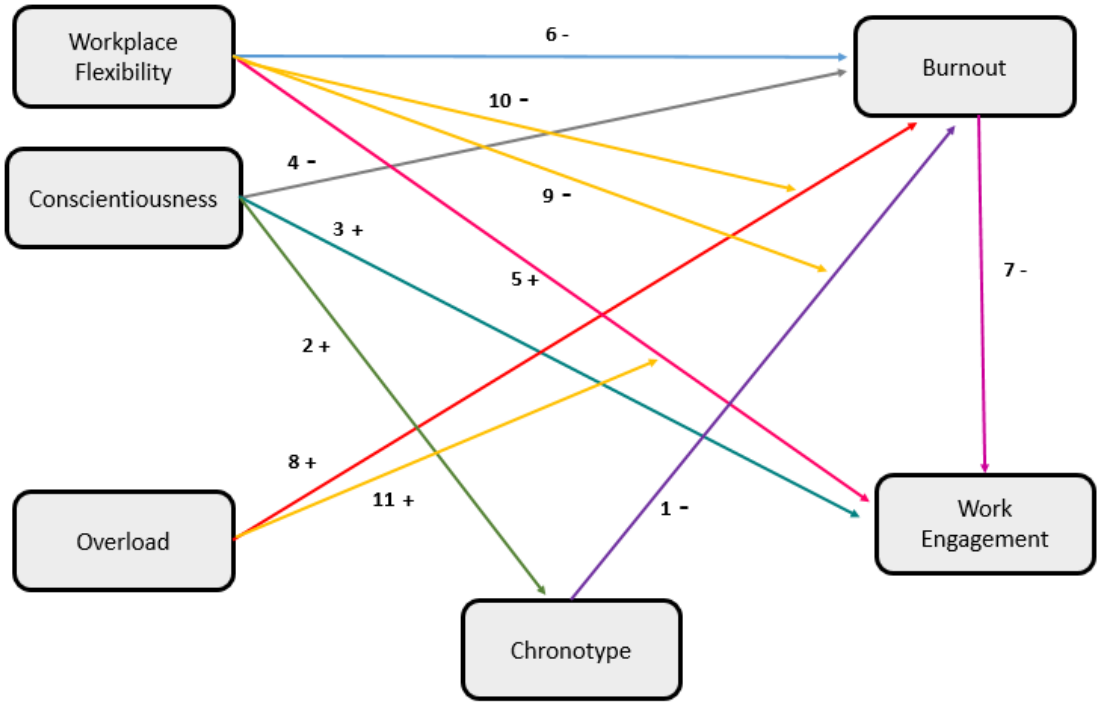
Hypothesis 11: Work overload moderates the relationship between workplace flexibility and work engagement such that the relationship is strengthened.

2.7 Conceptual Model

The conceptual model below illustrates the constructs of the study in terms of latent variables, as well as the relationships between them, which make up the 11 formulated hypotheses. Each relationship is numbered according to its corresponding hypothesis number and whether the relationship is positive or negative and strengthened or weakened.

Figure 2

The Conceptual Model Investigating Variance in Burnout and Work Engagement Amongst Knowledge Workers



2.8 Chapter summary

Chapter 2 aimed to provide an in-depth analysis of the existing literature on each of the concepts of this study (work engagement, burnout, conscientiousness, chronotype, work overload and workplace flexibility), and therefore to provide a theoretically sound justification for the research-initiating question. Based on the outcome of the investigation, relationships among these variables were proposed. A conceptual model of these relationships can be viewed in Figure 2.

Chapter 3 covers the methodology used for the current research study, which formed the basis of the operationalisation of the study to be able to investigate the theoretical hypothesis proposed in Chapter 2.

CHAPTER 3

METHODOLOGY

In this section, all information related to the methodology and attainment of the research results is discussed, such as the substantive research hypothesis, the research design, the structural model and statistical hypothesis, the measurement model and measurements, together with sampling, ethical considerations, data collection, missing values and the statistical analysis used for the current study.

3.1 Introduction

The present study utilised the JDRM as a framework to investigate the variance in knowledge workers' work engagement and burnout levels. Following the literature review in Chapter 2, the methodology chapter describes the methodology that was used to meaningfully add to the scientific body of knowledge within Industrial Psychology by attempting to answer the following research-initiating question:

- Why does variance exist in the work engagement and burnout levels of knowledge workers?

Chapter 1 provided the study aims as proposing and exploring the influences that would account for variance in the burnout and work engagement levels of employees working in a knowledge-intensive work setting through the development and empirical testing of the constructed structural model.

In line with the aim of the research study, the objectives were to:

- Develop a conceptual model that depicts a set of variables that explain the variance in employee engagement and burnout of the knowledge worker
- Test the structural model fit
- Evaluate the significance of the hypothesised paths in the model
- Examine modification indices to determine recommended changes to the model
- Highlight the results of and implications for management from the findings

Following the discussion of the research-initiating question and the aim and objectives of the study, the tools and procedures that were used to conduct the research to achieve the objectives are set out below.

3.2 Substantive research hypothesis

Based on the discussion in the literature review, the hypotheses below were tested.

Hypothesis 1: Chronotype has a negative linear relationship with burnout.

Hypothesis 2: Conscientiousness has a positive linear relationship with chronotype.

Hypothesis 3: Conscientiousness has a positive linear relationship with work engagement.

Hypothesis 4: Conscientiousness has a negative linear relationship with burnout.

Hypothesis 5: Workplace flexibility has a positive linear relationship with work engagement.

Hypothesis 6: Workplace flexibility has a negative linear relationship with burnout.

Hypothesis 7: Burnout has a negative linear relationship with work engagement.

Hypothesis 8: Work overload has a positive linear relationship with burnout.

Hypothesis 9: Workplace flexibility buffers the relationship between chronotype and burnout.

Hypothesis 10: Workplace flexibility moderates the relationship between work overload and burnout such that the relationship is weakened.

Hypothesis 11: Work overload moderates the relationship between workplace flexibility and work engagement such that the relationship is strengthened.

3.3 Research design

The research design is a plan, structure or strategy to investigate and obtain answers to research questions (Kerlinger & Lee, 2000). Two approaches to research design can be distinguished: experimental and ex post facto research designs. In experimental research, the researcher manipulates the controls of independent variables and observes their effects on the dependent variables. Ex post facto research is a systematic empirical inquiry and the researcher cannot control the independent variables, as their manifestations have already occurred or are inherently not manipulable. Therefore, inferences need to be made about relationships among variables without direct interventions from independent or dependent variables. The biggest difference between experimental and ex post facto research is control. In ex post facto research, the researcher does not have direct control over the variables, while in experimental research the researcher is able to manipulate and therefore control at least one of the variables (Kerlinger & Lee, 2000).

The ex post facto design also has some weaknesses, such as that the researcher is not able to manipulate the data, which makes it a prominent design type in Psychology. Secondly, there is a lack of potential to randomise the data and, finally, there is increased risk of improper interpretation.

Based on the current research question and objectives, it became clear that this study would be an ex post facto research design, as the researcher would not be able to manipulate any of the variables, and the other limitations of the ex post facto research design were also taken into account. In totality, the current study utilised an ex post facto correlational design, as it also relies on correlational techniques to determine the degree to which the variables are closely related.

Correlational designs have several advantages, such as that they investigate research questions that cannot be investigated by experimental procedures, and they allow for the estimation of the strength between variables (Tabachnick & Fidell, 2007). However, there is one disadvantage of this technique, which is that the correlations between variables are not causal (Tabachnick & Fidell, 2007) in that, if correlations are found among variables, it can only be said that one variable has an effect on another variable, but not that one variable causes the effect on the other variable.

All these advantages and disadvantages of the ex post facto design and correlational technique were taken into account throughout the research study. In the following section, the structural model and hypotheses are discussed to further provide in-depth details regarding the methodology used for the current study.

3.4 Proposed statistical model and hypothesis

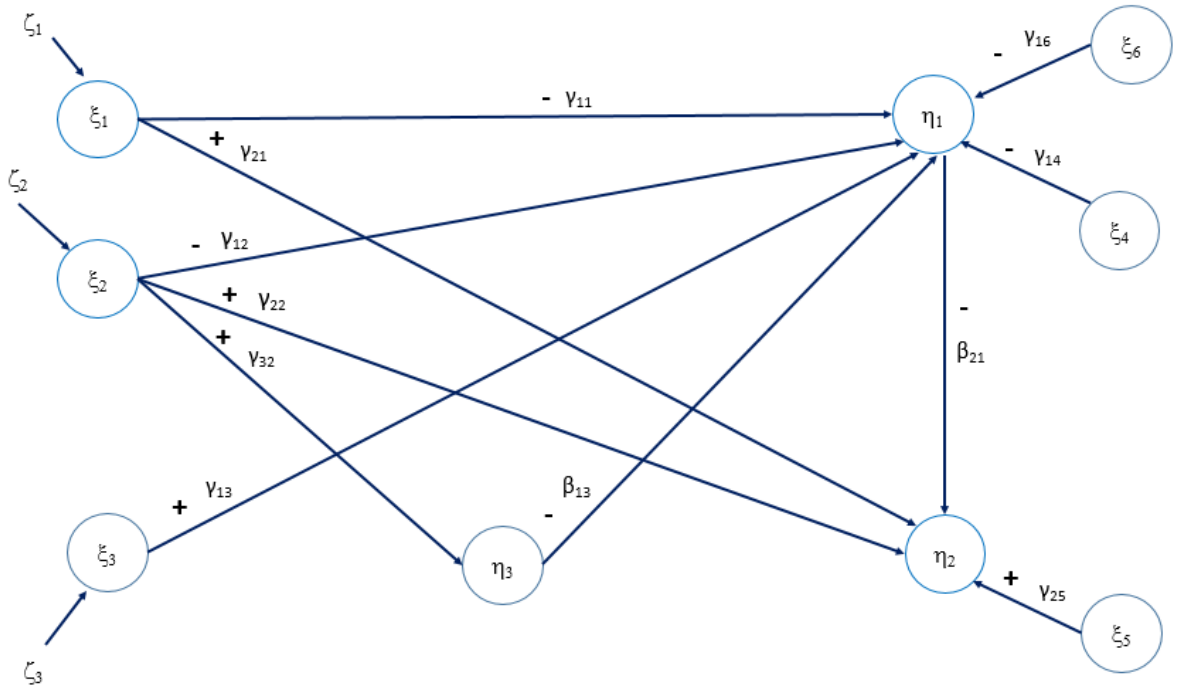
In this section, the statistical model (Figure 3) and hypotheses are discussed. All three types of hypotheses are included: exact fit, close fit and path-specific hypotheses.

3.4.1 Structural model

The structural model displayed as a path diagram in Figure 3 below is a schematic representation of the hypotheses that were introduced to answer the research-initiating question. It displays the hypothesised relationships between the endogenous (η) and exogenous (ξ) latent variables.

Figure 3

Proposed Structural Model



Notes: Psi is defined as a diagonal matrix; All the off-diagonals in the Phi matrix are free to be estimated.
ξ_1: Workplace flexibility; ξ_2: Conscientiousness; ξ_3: Work overload; ξ_4: Workplace flexibility*Chronotype; ξ_5: Work overload*Workplace flexibility; ξ_6: Workplace flexibility*Work overload; η_1: Burnout; η_2: Work engagement; η_3: Chronotype

3.4.2 Statistical hypotheses

Statistical hypotheses are specific to the ex post facto correlational research design and the statistical analysis method used. The statistical analysis used in this study was confirmatory factor analysis (CFA) and exploratory factor analysis (EFA), together with structural equation modelling (SEM), specifically partial least squares (PLS), followed by tests for moderation.

To determine how well the hypothesised structural model reproduces the data retrieved, the model needs to be tested against the exact fit and close fit null hypothesis. Below each will be discussed in more detail.

3.4.2.1 Exact-fit hypothesis

The first main hypothesis is the exact model fit hypothesis. With the exact model fit, it is proposed that the model will match the data perfectly and therefore provide a precise reproduction of the variables that influence the work engagement and burnout levels of knowledge workers.

H_0: RMSEA = 0
H_a: RMSEA > 0

3.4.2.2 Close-fit hypothesis

The probability of finding exact fit (that the observed data is an exact match to the structural model) is highly unlikely and therefore a more realistic research aim is to find close fit within the data. The close-fit hypothesis is given as:

H_0: RMSEA ≤ 0.05
H_a: RMSEA > 0.05
The overall fit of the model was tested through the exact- and close-fit hypotheses. Exact fit was rejected and, given that the model fitted the observed data reasonably well, each causal path was tested using the path-specific hypothesis. Below is the path-specific hypothesis in SEM notation.

3.4.2.3 Path-specific statistical hypothesis

All causal relationships in the model had to be tested, hence a hypothesis had to be created for each causal relationship, a indicated in Table 3 below:

Table 3

Path-specific Statistical Hypotheses

Hypotheses 1 to 6	**Hypotheses 7 to 11**
Hypothesis 1: Chronotype (η_3) has a negative relationship with burnout (η_1). H_{o1}: $\beta_{13} = 0$ H_{a1}: $\beta_{13} < 0$	Hypothesis 7: Burnout (η_1) has a significant negative relationship with work engagement (η_2). H_{a7}: $\beta_{21} = 0$ H_{a7}: $\beta_{21} < 0$
Hypothesis 2: Conscientiousness (ξ_2) has a significant positive relationship with chronotype (η_3). H_{o2}: $\gamma_{32} = 0$ H_{a2}: $\gamma_{32} > 0$	Hypothesis 8: Work overload (ξ_3) has a significant positive relationship with burnout (η_1). H_{o8}: $\gamma_{13} = 0$ H_{a8}: $\gamma_{13} > 0$
Hypothesis 3: Conscientiousness (ξ_2) has a significant positive relationship with work engagement (η_2).	Hypothesis 9: Workplace flexibility buffers the relationship between chronotype (ξ_4) and burnout (η_1).

H_{a3}: $\gamma_{22} = 0$ H_{a3}: $\gamma_{22} > 0$	H_{o9}: $\gamma_{14} = 0$ H_{a9}: $\gamma_{14} < 0$
Hypothesis 4: Conscientiousness (ξ_2) has a significant negative relationship with burnout (η_1). H_{o4}: $\gamma_{12} = 0$ H_{a4}: $\gamma_{12} < 0$	Hypothesis 10: Workplace flexibility moderates the relationship between work overload (ξ_6) and burnout (η_1) such that the relationship is weakened. H_{a10}: $\gamma_{16} = 0$ H_{a10}: $\gamma_{16} < 0$
Hypothesis 5: Workplace flexibility (ξ_1) has a significant positive relationship with work engagement (η_2). H_{a5}: $\gamma_{21} = 0$ H_{a5}: $\gamma_{21} > 0$	Hypothesis 11: Work overload moderates the relationship between workplace flexibility (ξ5) and work engagement (η2) such that the relationship is strengthened. H_{a11}: $\gamma_{25} = 0$ H_{a11}: $\gamma_{25} > 0$
Hypothesis 6: Workplace flexibility (ξ_1) has a significant negative relationship with burnout (η_1). H_{o6}: $\gamma_{11} = 0$ H_{a6}: $\gamma_{11} < 0$	

3.5 Measurements

To measure the variables as illustrated in the conceptual model, the following measurements were used for the current research study.

3.5.1 Work engagement

The Utrecht Work Engagement Scale (UWES) is the best measure of work engagement. It comprises questions in which employees report on themselves and consists of 17 items covering all three dimensions of work engagement. Each of the three dimensions are measured; six items are dedicated to vigour, five are dedicated to dedication and six are dedicated to absorption. Cronbach's alphas for each of the dimensions are .77, .90 and .80 respectively (Eek & Axmon, 2013).

Example items of each of the sub-dimensions are provided in Schaufeli & Bakker (2003) and includes:

Vigour 1) "At my work, I feel bursting with energy"

2) "At my work, I always persevere, even when things do not go well"

Dedication 1) "I find the work that I do full of meaning and purpose"

2) "I am enthusiastic about my job"

Absorption 1) "Time flies when I'm working"

2) "When I am working, I forget everything else around me"

The UWES uses a seven-point scale. Scores of 0 are interpreted as never, while scores of 6 indicate that the statement is always true (always). For this study, a total score was calculated for work engagement and interpreted when evaluating the hypothesised relationships.

3.5.2 Burnout

The Oldenburg Burnout Inventory (OLBI) was created to deal with some of the problems of the MBI (Demerouti et al. 2003). While the OLBI is similar to the MBI, it measures only two of the subscales of burnout, namely exhaustion and disengagement. According to Bakker et al. (2004, as cited in Halbesleben & Demerouti, 2005), the latest version of the OLBI contains items that have balanced, positive as well as negative wording. It also contains items to assess cognitive as well as physical components of the exhaustion dimension (Pines et al., 1981, and Shinn, 1982, as cited in Halbesleben & Demerouti, 2005), which has been suggested in the burnout literature. Halbesleben and Demerouti (2005) focused on measuring the validity and reliability of the OLBI translated into English, and found that the internal consistency of the measure was acceptable, with Cronbach's alpha scores from .74 to .87. The test-retest reliability was also sufficient for the OLBI, as the scores were moderately correlated ($r = .34$, $p < .01$) for disengagement and ($r = .51$, $p < .001$) for exhaustion. The validity was tested using factorial, convergent and discriminant validity and it was found that the OLBI showed adequate validity to be used as a measurement of burnout. The two-factor model of the OLBI was found to be the best-fitting measurement model, while the convergent and construct validity indicated that, although there was some convergence between the constructs, there was sufficient divergence to indicate that the constructs were contributing to the measurement of burnout independently. The findings by Halbesleben and Demerouti (2005) suggest that the OLBI is a suitable alternative to the Maslach Burnout Inventory/ Maslach Burnout Inventory-GS. Based on the abovementioned discussion, the OLBI was chosen as the suitable option for measuring burnout in the current study.

3.5.3 Chronotype

There are a number of measurements to measure the concept of chronotype, such as the Composite Scale of Morningness (CSM), the Morningness-Eveningness Questionnaire (MEQ) and the Munich Chronotype Questionnaire (MCTQ).

According to Levandovski et al. (2013), the MCTQ is the best measurement tool when working with desynchronisation as an indication of sleep phase, while the MEQ is best used when the goal of the research is to evaluate characteristics that are altered under specific conditions, e.g. chronotype.

The MEQ is a well-researched and well-documented questionnaire and is the instrument utilised most widely when researching chronobiology and sleep. The MEQ evaluates phase preferences over a 24-hour period and, as a result, has been the golden standard of chronotype assessment. The MEQ focuses on both sleep-wake information and appetite/exercise preferences, while also considering psychological and behavioural factors during the chronotype evaluation (Levandovski et al., 2013).

On the basis of the above, the MEQ (Horne & Östberg, 1976) was utilised to measure chronotype. Morningness-eveningness preference was identified on a continuum ranging from strong preference for morningness to strong preference for eveningness. This is in accordance with Bellicoso et al. (2014), who employed the MEQ to measure a continuous bipolar attribute. It contains five categories and categorical allocations are done according to the following scores. As can be seen, higher scores indicate a higher preference for morning type while lower scores indicate a higher preference for evening type:

- Definite morning type: score between 70 and 86
- Moderate morning type: score between 59 and 69
- Neither type: score between 42 and 58
- Moderate evening type: score between 31 and 41
- Definitive evening type: score between 16 and 30

Validation scores for the MEQ are provided from the significance of the correlation between the MEQ scores and melatonin onset, which serves as a physiological indicator of circadian period (Griefhahn et al., 2001, as cited in Roeser et al., 2012). According to Smith et al. (1989, as cited in Roeser et al., 2012), the MEQ has a correlation coefficient of $\alpha = .82$.

The MEQ furthermore makes provision for the classification of respondents into one of five categories of chronotype preference – definite morning type, moderate morning type, neutral type, moderate evening type and definite evening type. Bellicoso et al. (2014) also employed the MEQ as an indicator of (chronotype) type, but were forced to collapse the two extreme categories on either side of the continuum into a morningness group and an eveningness group due to sample numbers. The current study maintained the approach of measuring chronotype as a continuous bipolar attribute and used the 2009 version which was prepared by Terman, Rifkin, Jacobs and White (2001), as some of the questions and possible answers were rephrased from the original instrument developed by Horne and Östberg (1976) to accommodate spoken American English. The possible answers depicting a discrete scale have also been replaced with continuous graphic scales.

3.5.4 Work overload

Jackson and Rothmann (2005) developed the Job Demands-Resources Scale (JDRS) to measure job demands and job resources. The JDRS consists of 48 items, divided into the following dimensions as indicated in Table 4.

Table 4

Dimension of the JDRS

Pace and amount of work	Relationship with immediate supervisor
Mental load	Ambiguities about work
Emotional load	Information
Variety in work	Communications
Opportunities to learn	Participation
Independence in work	Contact possibilities
Relationships with colleagues	Uncertainty about the future
Remuneration and career possibilities	

The 48 items are rated on a four-point scale, ranging from 1 (“never”) to 4 (“always”). Jackson and Rothmann (2005) found seven reliable dimensions of the JDRS, of which work overload is one, with a Cronbach’s alpha of .75. The concept of work overload is assessed in the JDRS using nine items.

3.5.5 Conscientiousness

In this study, the Big Five Inventory (BFI) was utilised to measure conscientiousness. This measurement consists of 44 items in total that measure the five-factor model. The five subscales are extraversion, measured using eight items; agreeableness, measured using nine items; conscientiousness, with nine items; neuroticism, with eight items; and openness, with 10 items (Worrell & Cross, 2004). According to John and Srivastava (1999, as cited in Worrell & Cross, 2004), all items consist of short phrases that are founded upon prototypical trait adjectives related to each construct. All items are also measured using a five-point Likert scale, ranging from 1 (“disagree strongly”) to 5 (“agree strongly”). John and Srivastava (1999, as cited in Worrell & Cross, 2004) report alpha reliabilities ranging from .75 to .80 for the subscales, and results for the three-month test-retest reliability ranging from .80 to .90. With regard to the BFI’s validity, validity coefficients with the NEO-FFI (Costa & McCrae, 1992, as cited in Worrell & Cross, 2004) and the TDA (Goldberg, 1992, as cited in Worrell & Cross, 2004) averaged .91 for three of the big five personality traits: agreeableness, extraversion and conscientiousness, and .88 for neuroticism and .83 for openness, after being corrected for attenuation (John & Srivastava, 1999, as cited in Worrell & Cross, 2004). The BFI measurement is captured by John et al. (1991, 2008) of which the more recent items were used for the purpose of data collection for this study.

3.5.6 Workplace flexibility

The two measurement items found in the literature that were used for the current study to measure perceived workplace flexibility asked the respondents: “How much flexibility/control do you have in scheduling when you work?” and “How much flexibility/control do you have in scheduling where you work?”. Responses to both these questions were measured on a four-point Likert scale: 1 (“very little or no control”), 2 (“some control”), 3 (“a lot of control”) and 4 (“complete control”) (B. Jones, personal communication, August 13, 2019). The Cronbach’s alpha for this scale was found to be .91 (Jones et al., 2008). For the study, total scores were calculated for perceived workplace flexibility.

The two items from Jones et al. (2008) that were used in the current study to measure workplace flexibility are listed below:

- Overall, how much control (flexibility) would you say you have in scheduling when you work (your work hours)? (B. Jones, personal communication, August 13, 2019)
- Overall, how much control (flexibility) would you say you have in scheduling where you work (your workplace)? (B. Jones, personal communication, August 13, 2019)

3.6 Ethical considerations

It is important when conducting a study to consider the research participants and to protect their rights, dignity, safety and well-being during the research process.

In this case, there were no potentially detrimental risks or discomforts related to the study, except for slight discomfort that potentially could be experienced because of the length of the questionnaire. It also is possible that, during the process of reflecting on their current reality in order to answer the survey items, participants could have experienced dissatisfaction brought about by becoming aware of their current situation, which could result in a positive change in the participants' lives. The minor discomforts anticipated did not warrant the need for referral to healthcare professionals. However, the participants were provided with the contact information of the researcher and research supervisor if they should need to contact someone.

Conflict of interest was not a concern for the present study, as there were no opportunities for financial gains or career advancement, and the participants were not coerced into participation. Furthermore, best practice principles were followed to ensure that the research process maintained high research integrity.

Voluntary participation was also used during the research process, thereby avoiding a situation in which participants felt obliged to participate or coerced into participation. Prospective participants also had to give their consent before participating in the research, therefore ensuring that their participation was voluntary, and they were informed that they could opt out of the study at any point.

The informed consent form included important information so that the participants could make objective decisions regarding their participation, such as the name of the researcher and supervisor, the research institution, the purpose of the research, what participation in the research would involve, their rights in terms of participation, and where they could obtain more information about their research rights if they felt it was required. They were also provided with information on how

the study would be published and what it would be used for, and where further enquiries could be made regarding the research.

Participants were informed of this information at the start of the survey and had to tick a box to indicate that they gave their consent and were willing to proceed with the study. By clicking that they were willing to participate in the study, they were redirected to the survey. If they chose not to participate further, they were redirected to a page that thanked them for their time.

No identifiable or confidential information was collected from the participants and the study was therefore completely anonymous. There meant it was not possible to link the data to any participant, so there could be no possible negative repercussions. The data was stored in an electronic password-protected file on a password-encrypted computer, and a summary of the results was presented along with the discussion of the results.

3.7 Sampling

The study focused on participants who were employed and whose basic work task was thinking and predominantly involved working with information (in one form or another), but did not include or minimally involved work that required strength and physical skills or consisted predominantly of manual labour. The researcher invited individuals who met the sample criteria from within her personal network, and the invitation asked participants to distribute the invitation to their friends/ acquaintances. A combination of convenience and snowball sampling therefore was used.

While there is disagreement among researchers regarding sample sizes, they are aligned in terms of larger sample sizes having a higher probability of producing stable correlations between variables, and also having a higher likelihood of displaying replicability of outcomes (Babbie & Mouton, 2001). Some researchers have referred to specific numbers in terms of sample size. Bagozzi and Yi (2012), for example, stipulate that SEM requires no less than 100 and preferably more than 200 participants. According to Barrett (2007), a sample size of more than 200 could be regarded as reasonable, and SEM analysis based upon a sample size smaller than 200 should simply be rejected for publication, unless the population from which the sample needs to be retrieved is small or restricted in size. Westland (2010) says SEM in management information systems (MIS) has a relaxed approach to the choice of sample size. As early as the 1990s, MIS researchers referred to a rule of thumb, stating that at least 10 observations per indicator were necessary for adequate sample size. Several publications have justified the rule of 10 (see Westland, 2010, for a review); however, none of these researchers referred to the origin of the rule, in the publication by Nunnally (1967, as cited in Westland, 2010), which suggested that, without

any evidence to support the claim, at least ten times as many subjects as variables is the foundation for a good rule. The researcher therefore wanted to obtain between 100 and 200 participants for this study based on the recommendations by Bagozzi and Yi (2012), finally obtaining 218 participants after addressing missing values and imputing data for records with missing data.

Web-based surveys were utilised to collect data. Using web-based surveys is beneficial, as they require less administration, while also being more readily available for participants to complete at their leisure. While web-based surveys have the abovementioned benefits, they also could obtain lower response rates due to participants simply neglecting to complete the survey. However, the required number of participants was still obtained as these potential hurdles were not found in the current study. Data collection is discussed in more detail in the following section.

3.8 Data Collection

Before data collection could take place, the study proposal had to be submitted for ethics clearance from the Departmental Ethics Committee of the Department of Industrial Psychology at Stellenbosch University. A formal letter was received, indicating that ethics clearance had been granted and that the study may proceed (see Appendix A). Following the appropriate approvals, an online survey was set up using SunSurveys and, after various pilot tests, the survey was launched on the platform and prospective participants were invited to participate.

Invitations were sent to people in the researcher's networks who were regarded as knowledge workers. They were then asked to invite other people within their networks who could also be regarded as knowledge workers (snowball data collection technique) to participate. The invitation contained all the information that the prospective participants needed to decide whether they wanted to participate, such as ethical considerations, the purpose of the study and anonymity, and the requirements for participation. If the prospective participants wanted to continue their participation, they would have clicked on the link embedded in the invitation message.

Upon clicking on the link, the participants were redirected to the informed consent page (see Appendix B), where they gave consent and final willingness to participate. Ethical considerations, details of participation and anonymity were addressed on this page, and the potential participants were asked whether or not they wanted to proceed. If they selected to continue, they were redirected to the online survey. Upon starting the survey, they were asked some screening questions to ensure that they met the requirements for the study (if they were employed, whether their work involved thinking and working with information in one form or another, and whether their work involved strength, physical skills or manual labour). A few questions were also asked

to be able to accurately describe the sample group, such as age group, job classification, level of education, gender and race.

The online survey consisted of numerous sections for each of the measurement items used to assess burnout, work engagement, chronotype, conscientiousness, workplace flexibility and work overload. There were a total of 72 questions and it took participants no more than 20 minutes to complete. After approximately one month after starting with the data collection, 218 of the completed questionnaires were viable for data analysis after addressing those with missing values through k-nearest neighbours missing data imputation. The current research collected survey data and participants were not forced to respond to each item, therefore the likelihood of missing values was high.

3.9 Missing values

When making use of surveys as a data collection method, the likelihood of missing values is enlarged. Missing values can be attributed to non-responses and/or oversight on the part of the participants, and these missing values can have an impact on the results if not addressed. Missing values therefore must be addressed after data collection, but prior to data analysis. Addressing the missing values can be done with various well-known strategies, including list-wise deletion, pair-wise deletion, multiple imputations, full information maximum likelihood, or imputation through matching. Deciding which strategy to use was done after data collection and took into account the specifics of which values were missing and the need to determine the exact number of missing values (Switzer & Roth, 2002).

For the current research study, k-nearest neighbours missing data imputation was used to address the missing values, and the 218 responses used to do the analysis included the complete responses as well as the missing data that had to be addressed.

It is critically important to investigate whether any values are missing from the data before starting with data analysis, as missing values could have potential negative effects – also on the inferences made from the data (Theron, 2015). After the missing values were addressed, the data analysis could begin.

For the statistical analysis, a variety of analysis techniques were used, including SEM and PLS-SEM. According to Westland (2010), SEM is useful for the social sciences, given that many of its key concepts are not directly observable. Because these key concepts in the social sciences are inherently latent, construct validity and methodological soundness are important.

3.10 Statistical analysis

In this section, the different statistical analysis techniques used to analyse the data and evaluate the hypothesised relationships are discussed. Firstly, item analysis was used to assess the internal consistency reliability, followed by confirmatory factor analysis (CFA) to evaluate whether the observed data represent the theoretical factor structure of the latent variables. Exploratory factor analysis (EFA) was incorporated to freely explore a structure that would provide improved fit, and finally structural equation modelling (SEM) was used to evaluate the hypothesised relationships between latent variables. In this study, PLS-SEM was used.

3.10.1 Item analysis

Item analysis is an analytical process to determine internal consistency reliability – whether the items in a measure in fact measure the latent variable that it is designed to measure. Coefficient alpha is the most widely used and popular indication of internal consistency reliability in psychological research (Dunn et al., 2014). Internal consistency estimates are associated with item homogeneity; in other words, the degree to which the items on a test collectively measure the construct that they are intended to measure (Henson, 2001). Item analysis was performed using Statistica 13.5 on all measurement instruments, and analyses were done separately for each subscale. In addition to the Cronbach's alpha test for internal consistency reliability, item-total correlation and inter-item correlation were also performed. Inter-item correlations show to which extent the scores for one item are related to scores on all the other items of a scale, therefore indicating if the same content is assessed by all items (Cohen & Swerdlik, 2005, as cited in, Piedmont, 2014). High inter-item statistics therefore are indicative of items not contributing uniquely to the construct they are measuring (i.e. repetitive), whereas too low inter-item statistics would indicate non-discriminating items (i.e. do not explain the construct well enough, or possibly not at all). Item-total correlations indicate correlation with other items, and all items should correlate well with the average of the others. Scores that are too low indicate that the item is not measuring the same construct, therefore indicating redundancy (Tapsir et al., 2018).

3.10.2 Confirmatory factor analysis

In recent years, confirmatory factor analysis (CFA) has become a valuable analysis tool in the social and behavioural sciences. It is a structural equation modelling technique that investigates the causal relationship between the construct and the observed variables in a priori-specified, theory-derived models. The advantage of CFA is its ability to help researchers to connect theory

and observation. CFA can give researchers information regarding the fit of the data to specific, theory-derived measurement models in which items load onto the factors they were designed to measure. This analysis highlights the weaknesses of specific items (Mueller & Hancock, 2001).

Only once it can be shown that the indicator variables accurately portray the latent variable they were designed to represent can the comprehensive SEM model-fit indices be interpreted unambiguously or against the fitted structural model. Therefore, the fit of the measurement model used to operationalise the structural model first must be evaluated prior to fitting the comprehensive SEM model (Van Heerden & Theron, 2014).

CFA was therefore performed to confirm the factor structure of the latent variables under investigation. The R package, "lavaan" (latent variable analysis), was used to fit the measurement model. The multivariate normality assumption was investigated and, if rejected, robust maximum likelihood (MLR) estimates were used. If the normality assumption was not rejected, maximum likelihood estimation was used (Van Heerden & Theron, 2014). The measurement model fit was tested by assessing the goodness-of-fit statistics to investigate whether there was exact, good, or poor model fit. The results of the CFA would indicate the fit between the observed data and the theoretical factor structure of the given latent variables. If poor fit is found, exploratory factor analysis (EFA) needs to be conducted.

3.10.3 Exploratory factor analysis

Estimating the number of factors influencing variables and analysing which variables should be grouped together are done using exploratory factor analysis (DeCoster, 1998, as cited in Yong & Pearce, 2013). Explanatory factor analysis technique is based on an underlying hypothesis that states that there are *m* common latent factors within a dataset to be discovered. The aim is to reach the smallest number of common factors that would provide an explanation for the correlations (McDonald, 1985, as cited in Yong & Pearce, 2013). The purpose of items in a measurement is to elicit a response. This response is indicative of an individual's level on the latent variable under investigation. Tests are designed specifically so that all items in a measure or subscale of a test measure only one underlying latent variable. Thus, the variable under investigation creates a common source of variance across all items present in a measuring instrument, test or subscale. Explanatory factor analysis was used to test two assumptions, the unidimensional assumption, and the assumption that the latent variable explains significant amounts of variance in each item.

The EFA process involves four stages. First it is necessary to decide which factor analysis method to use to extract factors. Second, it is necessary to identifying an appropriate factor rotation method, followed by determining how many factors will be extracted and, finally, one has to calculate the factor loadings (Hair et al., 2014). EFA was performed using Statistica 13.5 and the R package "GPArotation".

3.10.4 Structural equation modelling (SEM)

SEM analysis is designed to determine the extent to which a theoretical model is supported by sample data (Schumacker & Lomax, 2010). SEM can be regarded as a hybrid between factor analysis and path analysis. The goal of SEM is similar to the goal of factor analysis – to provide a parsimonious summary of the interrelationships among variables (Kahn, 2006), while also being similar to path analysis in that hypothesised relationships between constructs can be tested (Weston & Gore, 2006). For the present study, SEM was used to test causal relationships between latent variables, assess the explained variance and describe the causal effects. The overarching goal of the current study was to determine whether operationalisation occurred successfully. There are two main approaches to SEM, viz. variance-based SEM, which is also known as partial least squares (PLS) analysis, and covariance-based SEM (Reinartz et al., 2009). Covariance-based SEM makes use of maximum likelihood estimations, while variance-based SEM uses partial least squares, as its alternative name suggests (Reinartz et al., 2009). In this study, variance-based SEM is referred to as PLS-SEM and, as discussed in the next chapter, only PLS-SEM analysis was done, as there were no grounds to justify a covariance-based SEM as the CFA results were not satisfactory.

3.10.5 PLS-SEM

PLS-SEM is a popular method as it enables the estimation of complex models with many indicator variables, constructs and structural paths, without enforcing distributional assumptions on the data. PLS-SEM is also a causal-predictive approach to SEM that highlights prediction in estimating statistical models, and the structures are designed to provide causal explanations (Sarstedt et al., 2017). This technique is therefore an improvement, as it does not have the problem of dichotomy between explanations and predictions, which is typically the foundation of the development of managerial implications (Hair et al., 2019).

Researchers should select PLS-SEM as an analytical technique under the following conditions: when the analysis is intended for testing a theoretical framework from a prediction perspective;

when the structural model under investigation is complex with many constructs, indicators and/or model relationships; when the objective of the research is exploratory in nature to further develop a theory; when the path model includes at least one formatively measured construct; and when a small population puts constraints on sample size. However, PLS-SEM can also be used for large sample sizes and when distribution issues are found within the data, for example a lack of normality (Hair et al., 2019). There are even more conditions under which PLS-SEM is the ideal method to be used; however, they are not particularly relevant to the current study.

PLS-SEM has two steps, the first being the assessment of the reflective measurement model, followed by the assessment of the structural model. When investigating the measurement model (i.e. outer loadings), composite reliability is determined by investigating the loadings, and values between 0.6 and 0.7 are regarded as acceptable. In exploratory research, anything higher than that is regarded as satisfactory to good, while values of 0.95 becomes problematic as they indicate redundancy, therefore reducing construct validity (Diamantopoulos et al., 2012, as cited in Hair et al., 2019).

To evaluate convergent validity, the average variance extracted (AVE) can be calculated for each construct and subscale. Acceptable AVE scores are 0.50 and higher, which indicates that the construct explains at least 50% of the variance in its items. Discriminant validity can be determined by using heterotrait-monotrait (HTMT) ratios. Discriminant validity becomes problematic when the HTMT ratios are high. When concepts are conceptually similar, HTMT values of more than 0.9 would indicate a lack of discriminant validity, whereas in situations where the constructs are conceptually different, HTMT values of 0.85 or lower would be indicative of a lack of discriminant validity (Hair et al., 2019).

The second step when doing PLS-SEM is to evaluate the structural model. The R^2 of the endogenous constructs need to be determined, as R^2 measures the variance explained in each of the endogenous constructs, hence indicating the model's explanatory power (Shmueli & Koppius, 2011, as cited in Hair et al., 2019). R^2 ranges from 0 to 1, and the higher the value, the more explanatory power. A value of 0.75 is substantial, 0.5 is regarded as moderate and 0.25 is considered weak (Hair et al., 2011, as cited in Hair et al., 2019).

Collinearity also needs to be examined so as not to bias the regression results. This is determined by calculating the VIF scores. Scores above 5 are indicative of collinearity issues among the predictor constructs. Ideally, VIF values of close to 3 and lower are regarded as sufficient (Hair et al., 2019).

The final step is to assess the statistical significance and path coefficients. Significant path coefficients are those that fall between -1 and +1 (Hair et al., 2019).

For the current research study, PLS-SEM was done using SmartPLS 3.3.2, and the results of the analysis are discussed in detail in the next chapter.

3.11 Summary

This chapter covered the methodological approaches used in the research process to address the research-initiating question and obtain answers to it, leading to the testing of the proposed hypothesis. This chapter covered the substantive research hypothesis, research design, proposed statistical model and hypotheses, the measurements used, sampling process, method and sample sizes, together with the data collection process, addressed the problem of missing values, and provided a full breakdown of the statistical analysis.

An ex post facto correlational design was chosen for this study, making use of a combination of snowball sampling and convenience sampling to fast-track the data collection process. Data was collected using an online survey sent to prospective participants. The survey consisted of 72 questions in total, assessing burnout, work engagement, conscientiousness, chronotype, work overload and workplace flexibility concepts. The online survey was open for participants to participate for approximately one month, and 182 viable records were obtained after addressing for missing values. The data was analysed and, after taking all necessary steps to ensure that the measurements were valid and reliable (item analysis, CFA, EFA), the hypothesised relationships were evaluated using PLS-SEM.

Chapter 4 provides a discussion and interpretation of the results relating to the statistical analysis discussed in Chapter 3. The chapter also includes a discussion of the descriptive statistics.

CHAPTER 4

RESULTS

4.1 Introduction

In this chapter, the statistical results are discussed. The statistical analysis conducted to obtain this data has been discussed at length in Chapter 3. Firstly, CFA and EFA were conducted to determine that the latent variable scales used to collect the data were in fact valid and reliable. The tests done determined the psychometric integrity of the instruments used, which validates the measurement model. Structural model fit was determined using covariance-based SEM and PLS-SEM, and a Sobel test was performed to test the mediation effect. The final scores of each hypothesis were then interpreted.

4.2 Descriptive Statistics

In the section below, the descriptive and demographic statistics are discussed. Table 5 below shows the job category statistics of the sample group. Most of the participants categorised their occupation as falling in the Administration, Business, Management & Human Resources, Engineering & Construction, Healthcare and IT & Technology job categories, while the lowest representation is in Agriculture, Design, Arts, Media & Marketing, Legal and Mathematics & Science.

Table 5

Summary of Job Category Statistics

Job Category	Representation of the sample
Administration, Business, Management & Human Resources	35%
Academics & Training	7%
Agriculture	0%
Design, Arts, Media & Marketing	3%
Education	4%
Engineering & Construction	14%
Finance	6%
Healthcare	13%
IT & Technology	12%
Legal	3%
Mathematics & Science	3%

The mean age of the sample was 39 years, while 36% of the sample was between 20 and 30 years old. The lowest representation came from the 61 and above age group (7%). Twenty-one percent of the sample was between 31 and 40 years old, 15% of the sample was between 41 and 50 years old, and 20% of the sample was aged between 51 and 60 years.

Of the sample, 71% were female and the remaining 29% were male. The majority of the sample fell in the white demographic group (73%), 19% fell into the coloured demographic group, while, 4% were black and 3% were Indian; 1% of the sample selected 'Other' as race group.

Regarding the education of the sample, 19% had a Bachelor's degree, 17% indicated that their highest level of education is Grade 12, 16% of the sample's highest level of education was an Honours degree and Master's degree respectively, while 15% indicated that their highest level of education was a National Diploma. The lowest categories of highest level of education were Grade 10 and 11 and other, with 1% each, and 6% of the sample indicated that they had obtained a doctorate.

Regarding the chronotype distribution, making use of the traditional categories as given in the MEQ, 1% of the sample group could be regarded as definite evening types, 8% were moderate evening types, 55% were neither type, 33% were moderate morning types and 3% could be categorised as definite morning types.

4.3 Item analysis of measurement instruments

Item analysis serves as a validation that the measurement model accurately measures an individual's standing on the latent variable. Item analysis was therefore performed for all items of the measurement instruments to evaluate the associated psychometric properties of the indicator variable on the latent variable. To this end, each subscale's Cronbach's alphas and item-total correlations were evaluated.

There are different reports in the literature on what an acceptable value is for Cronbach's alpha, typically ranging from 0.7 to 0.95 (Bland & Altman, 1997, DeVellis, 2003 and Nunnally & Bernstein, 1994, as cited in Tavakol & Dennick, 2011). Cronbach's alpha values increase when the number of items in a test increase, while low Cronbach's alpha values could be due to low numbers of items in the test, poor relatedness between items, or heterogeneous constructs (Tavakol & Dennick, 2011). According to Robinson et al. (1991), a Cronbach's alpha of as low as 0.6 is still acceptable when encountered during exploratory research. With regard to item-to-total

correlations, values higher than 0.50 and inter-item correlations exceeding 0.30 are deemed acceptable (Robinson et al., 1991).

Table 6 below provides a summary of the results of the item analysis for each sub-dimension of the constructs investigated.

Table 6

Summary of Item Analysis Results

Construct/subscale investigated	Sample size	Number of items in subscale	Mean	Standard deviation	Cronbach's alpha for subscale	Average inter-item correlation	Item-total correlation range
Conscientiousness		9	37.45	5.10	0.74	0.29	0.37 – 0.54
Work engagement		N/A	15.62	2.95	0.91	0.78	0.81 – 0.86
Vigour		6	31.06	5.96	0.81	0.42	0.43 – 0.69
Dedication		5	26.81	5.79	0.87	0.61	0.48 – 0.83
Absorption		6	30.50	6.25	0.77	0.38	0.33 – 0.68
Burnout	218	N/A	5.25	0.94	0.72	0.57	0.57
Disengagement		8	21.29	4.30	0.83	0.40	0.33 – 0.69
Exhaustion		8	20.68	4.17	0.84	0.40	0.42 – 0.73
Work overload		9	32.79	5.93	0.85	0.41	0.48 – 0.62
Workplace flexibility		2	3.47	1.44	0.66	0.49	0.49
Chronotype		19	54.82	8.92	0.78	0.18	-0.03 – 0.71

The results depicted in Table 6 above are discussed in the various sub-sections that follow.

4.3.1 Item analysis: Conscientiousness

The conscientiousness measure is unidimensional and consists of nine items and was discussed at length in Chapter 3. A Cronbach's alpha of 0.74 has been found for conscientiousness, indicating high reliability. All the item-total correlations were found to be positive, ranging from 0.37 to 0.54, which is acceptable as most of the items fall just below 0.5 or above 0.5. The average inter-item correlation for conscientiousness was 0.29, which falls just below the acceptable level of 0.3. The findings regarding conscientiousness indicate that the item measured what it was intended to measure and shows sufficient internal consistency.

4.3.2 Item analysis: Work engagement

The work engagement measurement was investigated as work engagement in its totality, along with each subscale as a main item of investigation on its own. For the analysis of the work

engagement measurement in its totality a Cronbach's alpha measurement of 0.91 was found; average inter-item correlations were 0.78 and item-total correlations were between 0.81 and 0.86. All these findings are above the rule of thumb for each analysis, as set out in the introduction to item analysis. The second part of the analysis was to investigate each subscale individually. First, with regards to the vigour subscale, a Cronbach's alpha of 0.81 was found, indicating high reliability. All the item-total correlations were found to be positive, ranging from 0.43 to 0.69, which is acceptable as six of the seven items are above 0.50. The average inter-item correlation is 0.42, which is well above the rule of thumb of 0.30. The findings on the vigour dimension of work engagement indicate that the item measured what it was intended to measure and shows sufficient internal consistency.

Second, for the dedication subscale, a Cronbach's alpha of 0.87 was found, indicating high reliability. All item-total correlations were found to be positive, ranging from 0.48 to 0.83, which is acceptable as four out of the five items show item-total correlations well above .50 and the other falls just below the .50 mark. In terms of the average inter-item correlation, the reported value of 0.61 exceeds the rule of thumb of 0.30. Based on the findings, the item measured what it was intended to measure and shows sufficient internal consistency.

Last, for the absorption subscale, a Cronbach's alpha of 0.77 was found, indicating high reliability. All item-total correlations were positive and ranged between 0.33 and 0.68, which is acceptable as five out of the six were well above the 0.50 rule of thumb. The average inter-item correlation was found to be 0.38, which suffices in terms of the 0.30 rule of thumb. The findings therefore indicate that this item measured what it was intended to measure and shows sufficient internal consistency.

4.3.3 Item analysis: Burnout

Burnout was investigated for item analysis in two ways. Firstly, burnout was measured in its totality, followed by each of its subscales individually. For the burnout measurement in its totality, a Cronbach's alpha of 0.72 was found, therefore exceeding the 0.6 score of acceptability. Average inter-item correlation was found to be 0.57 and item-total correlations were 0.57, thus indicating acceptability for both criteria. For the second part, each subscale was investigated individually, starting with disengagement. The disengagement subscale had a reported Cronbach's alpha of 0.83, which indicates reliability. Furthermore, item-total correlations ranged from 0.33 to 0.69 and were all positive. This is acceptable, as six out of the eight items are above .50. Regarding the average inter-item correlation, a value of 0.40 exceeds the 0.30 rule of thumb. These findings

provide evidence that the item measured what it was intended to measure and shows sufficient internal consistency.

Secondly, a Cronbach's alpha value of 0.84 was found for exhaustion, with positive item-total correlations ranging from 0.42 to 0.73. Seven out of the eight items were above 0.50. The average inter-item correlation scores of .40 exceed the 0.30 acceptability rule. Both these findings are acceptable and indicative of reliability, therefore providing evidence that the item measured what it was intended to measure.

4.3.4 Item analysis: Work overload

Work overload was measured using nine items. A Cronbach's alpha value of 0.85 was reported, which indicates reliability. Item-total correlations were all positive and ranged from 0.48 to 0.62. This is acceptable, as seven out of the nine items exceed the 0.50 acceptability rule and the other falls just below the acceptable level. The average inter-item correlation of 0.41 exceeds the acceptable score of 0.30. This indicates that the work overload item measured what it was intended to measure.

4.3.5 Item analysis: Workplace flexibility

Workplace flexibility was measured with two items and had a reported Cronbach's alpha of 0.66. An acceptable value for Cronbach's alpha is 0.7. However, given that the number of items in a scale influences the Cronbach's alpha value (as discussed previously), the value reported is sufficient to indicate reliability. Item-total correlations were found to be 0.49 for both, which falls just below the acceptable 0.50 score, while average inter-item correlations exceeded the acceptable score of 0.30. It therefore can be concluded that the workplace flexibility item measured what it was intended to measure and shows acceptable internal consistency.

4.3.6 Item analysis: Chronotype

For this study, chronotype was regarded as a formative construct, therefore standard reliability analysis did not apply to this measurement. Formative constructs are generated by observed variables rather than in reflective constructs where the latent variable creates the observed variable (Treiblmaier et al., 2011). Two characteristics of formative indicators are that they correlate positively or negatively or lack any correlation whatsoever (Bollen, 1984, as cited in Diamantopoulos et al., 2008). The indicators furthermore characterise a set of distinct causes and are therefore not interchangeable, as each indicator captures a specific aspect of the construct's

domain (Jarvis et al., 2003 and Rossiter, 2002, as cited in Diamantopoulos et al., 2008). This can be seen in the results derived from the item analysis, which indicate an average inter-correlation as low as 0.18, while the item-total correlations were found to be both positive and negative, with values ranging from -0.03 to 0.71. The Cronbach's alpha for the chronotype measure was found to be 0.78, which indicates good reliability as measured by internal consistency.

4.3.7 Concluding remarks regarding item analysis results

The outcome of the item analysis provides sufficient evidence for the inclusion of all measurement items for each measurement discussed in section 3.5. All subscale Cronbach's alphas were above 0.7, therefore indicating acceptable internal consistency. For work engagement and burnout, the two measurements and their subscales showed acceptable Cronbach alpha's levels. With regard to measurement items without subscales, only workplace flexibility was found to be lower than the acceptable Cronbach's alpha of 0.7. This could be justified given that the reported Cronbach's alpha of 0.66 were just below the acceptable level and could be explained by the measurement only having two items, which is known to decrease the Cronbach's alpha value.

Given that results of the item analysis were satisfactory, a CFA was performed to determine whether the subscales accurately measured the latent variables.

4.4 CFA of measurement instruments

CFA was performed to determine the extent to which the measured variables represent the construct to provide evidence of construct validity (Hair et al., 2014). For each latent variable, a measurement model was created and evaluated. The multivariate normality assumption was rejected, and thus robust maximum likelihood estimation was used to determine the model parameters. Robust maximum likelihood is used in cases where the multivariate normality assumption is not adhered to or when the data is ordinal; the advantages of this model is that it can be used on small sample sizes or on large models (Mîndrilă, 2010).

CFA provides several sources of statistics that can be used to determine the fit of the measurement model, such as the Yuan-Bentler chi-square, the root mean square error of approximation (RMSEA), the goodness-of-fit index (GFI) and the adjusted goodness-of-fit index (AGFI).

Firstly, the chi-square score can be used as an indication of model fit. However, using this score on its own can lead to the rejection of plausible models, as it is sensitive to both sample and model size, hence a better estimate is to divide the chi-square by the degrees of freedom. Scores obtained

that are lower than 3 indicate good model fit (Mîndrilă, 2010). Secondly, according to earlier researchers such as Browne and Cudeck (1993) and Jöreskog and Sörbom (1993) (as cited in Xia & Yang, 2019), RMSEA scores serve as an informative absolute-fit index that can be used to interpret good fit, with RMSEA values of less than .05 indicating good fit, and RMSEA values of between 0.05 and 0.08 showing reasonable fit. RMSEA values of between .08 and .10 indicate average/mediocre fit, while RMSEA scores of more than .10 indicate poor fit (MacCallum et al., 1996, as cited in Hooper et al., 2008). Thirdly, AGFI is an indication of how much variance is accounted for by the proposed model (Bollen, 1989, as cited in Mîndrilă, 2010), and values above .9 typically are regarded as acceptable, while values of .95 indicate a good fit of the proposed model on the data (Mîndrilă, 2010). According to Hooper et al. (2008) for both AGFI and GFI values greater than .90 show good fit, with values close to 1.00 being the best.

Table 7 below provides a representation of the goodness-of-fit statistics for burnout, work engagement and a combined conscientiousness, work overload and workplace flexibility measurement model. Given that chronotype serves as a formative construct, standard reliability analysis does not apply.

Table 7

Goodness-of-Fit Statistics of the Measurement Models

Measure	Yuan-Bentler chi-square	Degrees of freedom	P-value	RMSEA	GFI	AGFI
Burnout	349.20	103	0.00	0.102	0.826	0.771
Work engagement	424.36	116	0.00	0.104	0.779	0.709
Conscientiousness, WO & WF	598.67	168	0.00	0.109	0.764	0.705

Note: WO = work overload; WF = workplace flexibility

4.4.1 Burnout measurement model

The Yuan-Bentler value for burnout was found to be 349.20. Dividing by the degrees of freedom results in a score of 3.39, which is higher than the acceptable score of less than 3 (Mîndrilă, 2010), therefore indicating poor model fit. RMSEA scores for burnout were found to be just above the minimum acceptable level of higher than .10 (MacCallum et al., 1996, as cited in Hooper et al., 2008). The p-value is smaller than 0.01 and therefore indicative that the exact-fit null hypothesis (RMSEA = 0; $p < .05$) should be rejected, while the RMSEA score of .10 is indicative that the close-fit null hypothesis (RMSEA $\leq .05$; $p > .05$) should also be rejected, therefore indicating poor

fit. These findings provided evidence that an EFA needed to be done. AGFI and GFI scores of 0.826 and 0.771 respectively were found, also indicating that the model fit is not acceptable.

4.4.2 Work engagement measurement model

The chi-square score for work engagement was found to be 424.36. Using the method explained by Mîndrilă (2010) and dividing the chi-square by the degrees of freedom resulted in a score of 3.66, which is higher than the acceptable score of 3, therefore indicating poor fit. Evaluating the RMSEA score of 0.104 against the guidelines for acceptable RMSEA scores indicates that the RMSEA scores are not acceptable and highlights the need for further investigation via EFA. The GFI and AGFI results of 0.779 and 0.709 respectively do not adhere to the minimum guidelines, and therefore are indicative of poor fit.

4.4.3 Conscientiousness, work overload and workplace flexibility measurement model

The Yuan-Bentler value for the combined conscientiousness, work overload and workplace flexibility measure was found to be 598.67 and, when dividing by the degrees of freedom, resulted in a score of 3.56, which is higher than the acceptable score of less than 3 (Mîndrilă, 2010), therefore indicating poor model fit. RMSEA scores for the combined measures were found to be 0.109, indicating poor fit, as they were below the rules of acceptability (McCallum et al., 1996, as cited in Hooper et al., 2008). The AFGI score of 0.705 and the GFI score of 0.764 can be regarded as not quite meeting the acceptable standard of 0.9.

4.4.4 CFA summary

The results of the CFA did not provide evidence of good fit of the measurement models tested, therefore indicating that the measurement models did not explain the construct sufficiently and the factor structure was not confirmed. A likely reason for this could be that participants did not understand the questions, perceived the questionnaire as being too long, and lost focus or did not answer the questions properly. An EFA was conducted to further analyse the factor structure.

4.5 Exploratory factor analysis

EFA was conducted on the burnout and work engagement scale, along with collective analysis of the workplace flexibility, work overload and conscientiousness scales, to provide an indication of how many factors were needed to best represent the data. The EFA process comprised four stages.

During each stage, the researcher had to make decisions regarding how the EFA would be performed and what the most accurate factor structure for each construct should look like.

For each scale, principal component analysis was conducted as the factor-extraction method and factor rotation was used to discriminate between factors, with oblimin rotation used in cases of factor fission. The number of factors that should be extracted were determined with Catell's scree test, Kaiser's eigenvalues greater-than-one criterion, the cumulative percentage of variance extracted and Horn's parallel analysis. In the section below, each of the scales is discussed in terms of the four factor-extraction criteria.

Firstly, the Catell (1966) eigenvalues scree plot can be used to determine the optimal number of factors to retain. When drawing two lines through the data points of the scale, a horizontal line through the smaller eigenvalues (indicated with the black dotted line in Figure 4 and 5) and a vertical line through the larger eigenvalues the point where the two lines cross acts as the elbow of the scree plot (see Figure 4 and 5) and all number of factors falling to the left of the elbow (see Figure 4 and 5) should be considered as significant. According to Lewith et al. (2010), the scree plot produces too few factors.

Secondly, Kaiser's criterion should be interpreted in terms of how many factors have eigenvalues greater than one (Lewith et al., 2010). The outcome of this analysis indicates the factor structure (represented by the orange line in Figure 4 below). According to Lewith et al. (2010), Kaiser's criterion has a tendency to produce too many factors, while Tabachnick and Fidell (2017) mention that the interpretation of the graph is inherently subjective. Thus, other criteria also need to be considered before making a final decision on the number of factors to extract.

Thirdly, the cumulative percentage of variance was also used to determine the number of factors to be extracted. It has been recommended that research studies in humanities should have a cumulative percentage of variance values that range between 50% and 60% (Hair et al., 1995, as cited in Williams et al., 2010). According to Hair et al. (2014), it is not uncommon in the social sciences to find percentages as low as 60%, and sometimes even lower, while still being regarded as satisfactory.

The final test performed to provide evidence of the number of factors to extract for the measures is Horn's parallel analysis. According to Thompson (2004, as cited in Williams et al., 2010), the parallel analysis technique is one of the best methods to determine the number of factors that should be extracted or retained. In this method, the actual eigenvalues are compared with random-order eigenvalues and decisions are made to retain factors when the actual eigenvalue exceeds the

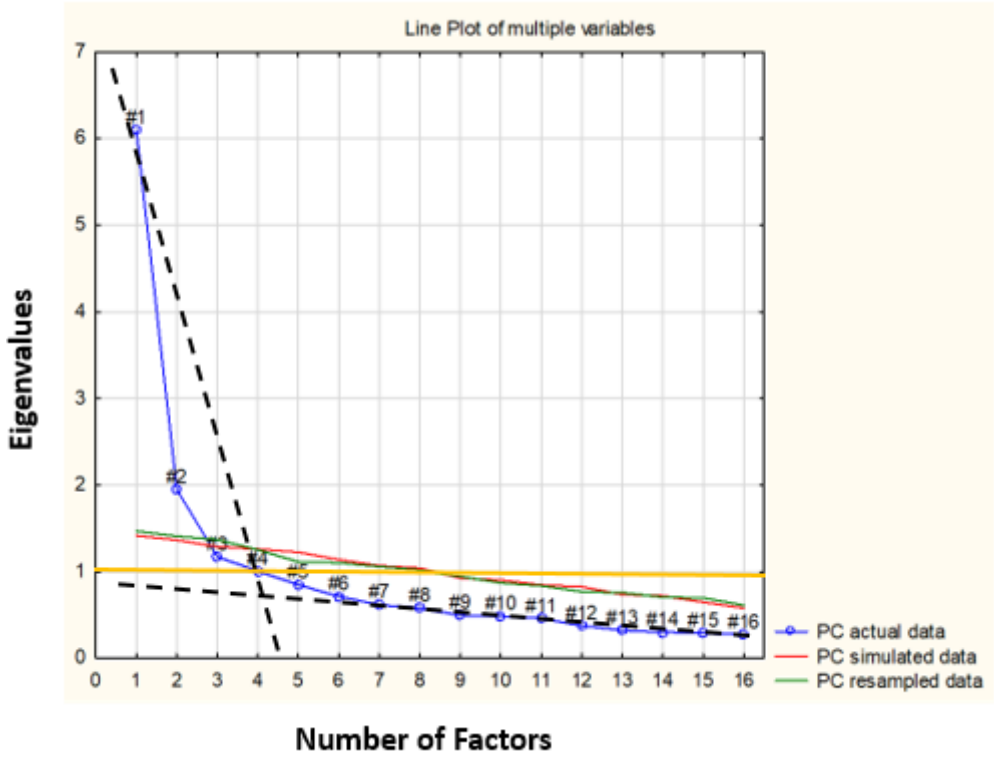
random-order eigenvalue. After this exercise, a final number of factors becomes apparent and the researcher is left with the decision of which of the factors extracted makes most conceptual sense (Williams et al., 2010).

4.5.1 Factor-extraction criteria of burnout scale

In Catell's eigenvalue scree plot, represented in Figure 4 below, two factors can be identified that make the burnout scale a two-factor structure based on the interpretation of the scree plot.

Figure 4

Eigenvalues Scree Plot of the Burnout Measure



In terms of Kaiser's criterion, three factors have eigenvalues greater than 1. However, the one factor is just above 1 and is therefore discarded, leaving just two factors. The specific eigenvalues for the two factors are 6.09 and 1.95 from highest to lowest respectively.

Table 8 below shows that the cumulative percentage of variance is given as 38 for factor 1 and 50 for factor 2, therefore not fully complying with the guidelines as set out in Hair et al. (2014). It is also possible to interpret the cumulative percentage as follows: 50% of the variance in the data can be explained by the model loading on factor 2, while 38% of the variance in the data can be explained by the model loading on factor 1.

Table 8

Results for Cumulative Percentage of Variance for Burnout Measure

Factor	Percentage of total variance	Cumulative eigenvalue	Cumulative percentage
1	38	6.09	38
2	12	8.04	50

In terms of parallel analysis, the actual and the simulated data points are shown in Figure 3 and based on this comparison, only two factors can be retained.

Table 9 below provides a breakdown of the items in the burnout measurement, and the factor on which they load significantly. Items 1, 3, 6, 7, 9, 13 and 15 all load onto factor 2, while items 2, 4, 5, 8, 10, 12 and 14 all load onto factor 1. This is in line with the traditional assignment of items to the two factors of the burnout measurement. The instrument used for measuring burnout is the OLBI, a measure statistically shown to be valid and reliable. The two factors making up the subscales of the OLBI are disengagement and exhaustion. Factor 1 therefore can be identified as exhaustion, while factor 2 can be identified as disengagement. Items 11 and 16 do not clearly load on either factor 1 or 2 based on the current findings. These two items are 'Sometimes I feel sickened by my work tasks' and 'When I work, I usually feel energised'. In the light of these two items, it can be argued that the item 'sometimes I feel sickened by my work tasks' should theoretically load more onto the disengagement factor, as disengagement is defined in terms of the OLBI as a feeling of distancing between the person and their work, both generally and in terms of work object and work content (Demerouti et al., 2010). The disengagement items refer to the relationship between the employees and their jobs, especially in terms of identifying with one's work and willingness to continue with one's occupation (Demerouti et al., 2010). The 'when I work, I usually feel energised' item should theoretically be loading more onto the exhaustion factor, as it refers to the same underlying theme of physical, affective and cognitive strain (Demerouti et al., 2010).

Table 9

Results for Horn's Parallel Analysis – Two-factor Burnout Measure

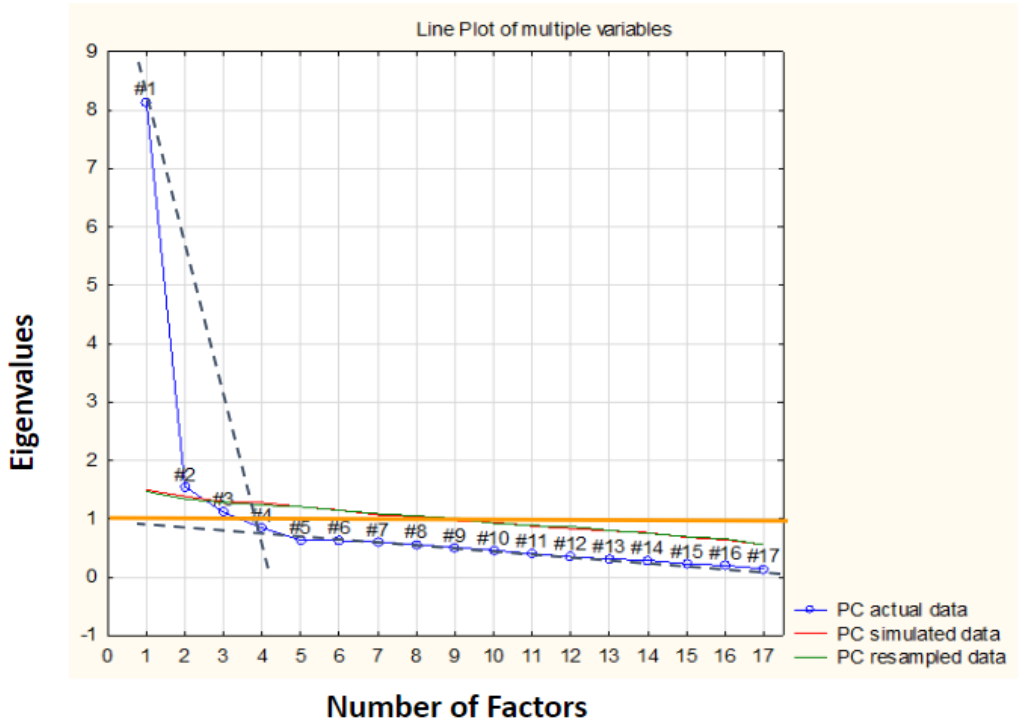
Burnout		
Items	**Factor 1**	**Factor 2**
1	0.08	-0.8
3	-0.33	-0.54
6	0.07	-0.68
7	-0.06	-0.79
9	-0.14	-0.64
11	-0.45	-0.3
13	0.27	-0.63
15	-0.09	-0.73
2	-0.63	0
4	-0.72	-0.1
5	-0.66	0.05
8	-0.59	-0.27
10	-0.68	0.07
12	-0.81	-0.01
14	-0.65	0.19
16	-0.43	-0.45

4.5.2 Factor-extraction criteria of work engagement scale

In Catell's eigenvalue scree plot, which is shown in Figure 5 below, three factors can be identified, making the work engagement scale a three-factor structure.

Figure 5

Eigenvalues Scree Plot of the Work Engagement Measure



In terms of Kaiser's criterion, three factors have eigenvalues greater than 1. However, the one factor is just above 1 and is therefore discarded, leaving just two factors. The specific eigenvalues for the two factors are 8.15 and 1.55 from highest to lowest.

Table 10 below shows the cumulative percentage of variance as 48 for factor 1 and 57 for factor 2. Therefore, factor 2 complies fully with the guidelines set out in Hair et al. (2014), while factor 1 is close to meeting the 50% acceptability mark. Interpreting the cumulative percentage indicates that 48% of the variance in the data is explained by factor 1, and 57% of the variance is explained by factor 2.

Table 10

Results for Cumulative Percentage of Variance for Work Engagement Measure

Factor	Percentage of total variance	Cumulative eigenvalue	Cumulative percentage
1	48	8.15	48
2	9	9.70	57

In terms of parallel analysis, the actual and the simulated data points are shown in Figure 4 and, based on this comparison, only two factors can be retained. While doing the oblimin rotation for work engagement, both a two-factor and a three-factor model were extracted.

Table 11

Results for Horn's Parallel Analysis – Two-factor Work Engagement Measure

Work engagement		
Items	**Factor 1**	**Factor 2**
3	-0.71	-0.02
6	-0.4	-0.21
9	-0.69	-0.14
11	-0.43	-0.56
14	-0.21	-0.62
16	0.23	-0.82
2	-0.73	-0.11
5	-0.82	-0.14
7	-0.71	-0.26
10	-0.56	-0.38
13	-0.15	-0.65
1	-0.82	0.24
4	-0.88	0.1
8	-0.89	0.14
12	-0.43	-0.4
15	-0.37	-0.39
17	-0.22	-0.47

Table 12

Results for Horn's Parallel Analysis – Three-factor Work Engagement Measure

Work engagement			
Items	**Factor 1**	**Factor 2**	**Factor 3**
3	-0.67	-0.13	0.02
6	-0.44	-0.41	-0.16
9	-0.5	0	0.39
11	-0.22	-0.39	0.45
14	-0.18	-0.73	-0.01
16	0.3	-0.8	0.12
2	-0.59	-0.06	0.26
5	-0.69	-0.11	0.25
7	-0.57	-0.21	0.28
10	-0.27	-0.07	0.65
13	-0.13	-0.79	-0.05
1	-0.87	0.01	-0.2
4	-0.81	0.03	0.09
8	-0.84	0.06	0.06
12	-0.16	-0.09	0.62
15	-0.06	0	0.71
17	0.12	0.01	0.82

Two oblimin rotations for the work engagement construct were extracted, one with a two-factor model (Table 11), while the other was a three-factor model (Table 12). Comparing the results of Horn's parallel analysis to the measurement for work engagement, viz. the UWES, it becomes apparent that the UWES identifies three distinct factors within the measurement, therefore siding with Table 12. Further investigation of Table 12 in comparison to what is known regarding the factor loadings of the UWES shows there is not much consistency. In the UWES, three factors are identified – vigour, dedication and absorption. In the UWES measurement, items 1, 4, 8, 12, 15 and 17 load onto the vigour factor, while items 2, 5, 7, 10 and 13 load onto the dedication factor and items 3, 6, 9, 11, 14 and 16 load onto the absorption factor.

Firstly, evaluating the three factors in Table 12 and comparing to what is known about the UWES, factor 1 can be identified as the vigour dimension. Items 1, 4 and 8 load onto factor 1 and also load onto the vigour dimension according to the UWES. However, items 12, 15 and 17 load onto factor 3 according to the results displayed in Table 12. These three items are: 'I can continue working for very long periods at a time', 'At my job, I am very resilient, mentally' and 'At my work I always

persevere, even when things do not go well'. While these three items can be argued to load both onto the vigour and dedication dimensions, they load onto the vigour dimension according to the UWES and therefore the researcher also regarded them as loading onto the vigour dimension.

With regard to the absorption dimension, items 3, 6, 9, 11, 14 and 16 traditionally load onto the absorption factor in the UWES. When evaluating the items that are meant to load onto the absorption dimension according to the UWES, we find many inconsistencies. Items 14 and 16 were found to load onto factor 2, therefore suggesting that factor 2 could be identified as the absorption dimension. The remainder of the items were all found to load onto different factors or to cross-load among two factors. Item 3 was found to load onto factor 1, which previously has been identified as vigour. Items 6, 9 and 11 cross-load onto more than one factor. Items 6 and 11 load onto factor 2 and factor 3. Item 6 is 'When I am working, I forget everything else around me', while item 11 is 'I am immersed in my work', which speaks more to the absorption factor than to the dedication factor, therefore factor 2 can be identified as absorption.

The remaining factor – factor 3 – should then be dedication according to the process of elimination. Traditionally, items 2, 5, 7, 10 and 13 load onto the dedication dimension. However, in the current study, items 2, 5 and 7 were found to load onto the vigour dimension. The remaining items, 10 and 13, were found to cross-load onto factors 2 and 3. Item 10 is 'I am proud of the work that I do', while item 13 is 'To me, my job is challenging', which by the nature of the item would seem to suggest that the items are more in line with the theoretical concepts of dedication than of absorption. The researcher therefore sided with the item allocation as per the traditional measure.

While it is known that the UWES identifies three distinct factors for work engagement, the results shown in Table 12 would seem to suggest the possibility that, in this dataset, there are only two factors in the work engagement construct.

Interpreting Table 11 in more detail, we find that items 3, 9, 2, 5, 7, 1, 4 and 8 load onto factor 1, while items 14, 16, 13 and 17 load onto factor 2. Items 6, 11, 10 and 12 are cross-loading. Comparing this to the item allocation as per the UWES, there is little consistency between the UWES allocation and the findings of the current study's EFA. Further evaluating the cross-loading items and looking at the nature of each item to infer a decision on the allocation, it is found that item 6, 'When I am working, I forget everything else around me', conceptually coincides with the absorption dimension. Item 11, 'I am immersed in my work', also seems to point to the absorption dimension. Item 10, 'I am proud of the work that I do', does not make logical sense, even though it clearly is an item referring to dedication, as only two factors can be, thus not leaving room for

the traditional three factors. And, finally, item 12, 'I can continue working for very long periods at a time', conceptually seems to point to the vigour dimension. When analysing the items assigned to factor 1 in Table 11, inconsistency is found in terms of assigning the items to a dimension on face value. For both factor 1 and 2, each factor contains a mix of items that, according to the UWES, are assigned to all three dimensions. Conceptually there are no grounds for only two factors, as the allocations of items to factor 1 and 2 hold no theoretical or conceptual consistency.

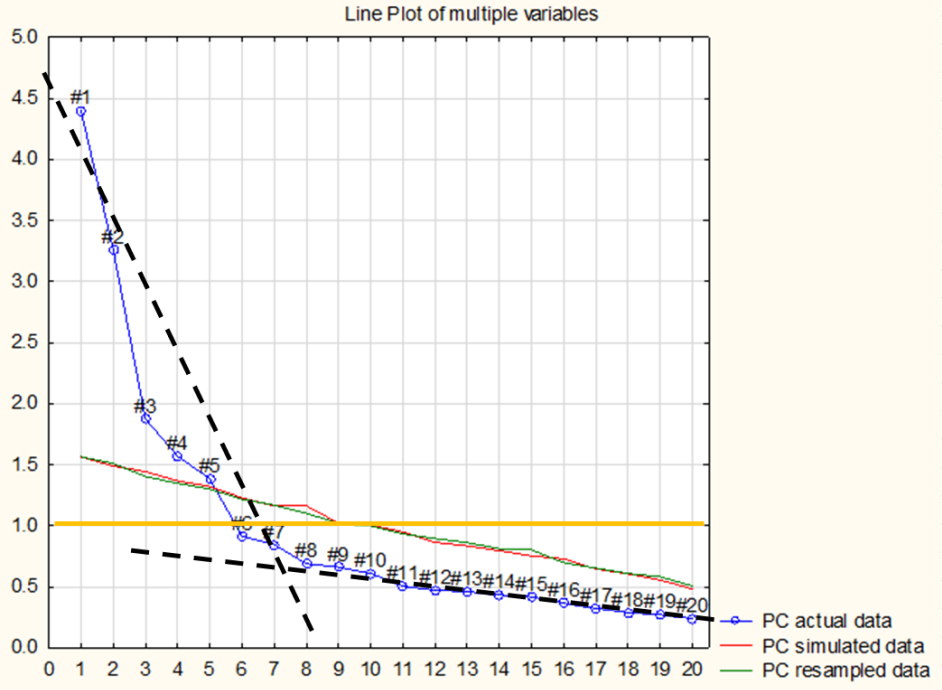
Given the inconsistency in the two-factor measurement structure, and with the UWES being a reputable measurement to measure work engagement and known for its three-factor structure, the decision has been made to retain the three-factor structure for work engagement.

4.5.3 Factor-extraction criteria of the work overload, workplace flexibility and conscientiousness scales

In Catell's eigenvalue scree plot, which is represented in Figure 6 below, five factors can be identified.

Figure 6

Eigenvalue Scree Plot of the Work Overload, Workplace Flexibility and Conscientiousness Measures



In terms of Kaiser's criterion, five factors have eigenvalues greater than 1. The five factors identified had eigenvalues of 4.4, 3.26, 1.88, 1.57 and 1.39.

When evaluating the cumulative percentage of variance for the combined work overload, workplace flexibility and conscientiousness measures, Table 13 shows that only two factors adhered to the general guidelines for acceptable cumulative percentages of between 50% and 60%. Factor 3 fell just below the 50% level of acceptability and it was decided to include it, giving a total of three factors according to the cumulative percentage of variance.

Table 13

Results for Cumulative Percentage of Variance for Combined Work Overload, Workplace Flexibility and Conscientiousness Measure

Factor	Percentage of total variance	Cumulative eigenvalue	Cumulative percentage
1	22	4.40	22
2	16	7.66	38
3	9	9.53	48
4	8	11.10	55
5	7	12.49	62

In terms of parallel analysis, the actual and the simulated data points are shown in Figure 5 five factors were retained on the basis of this comparison.

Horn's parallel analysis (shown in Table 14) shows that the work overload items load onto factor 1 as well as factor 5. This would suggest that work overload is not a unidimensional construct but could potentially be a two-factor structure. From the literature we know that work overload can be regarded as an emotional and mental load (Rothmann et al., 2006), while Kuschel (2015) shows that two types or sets of work overload have been identified: quantitative and qualitative. Focusing specially on Rothmann et al.'s (2006) definition of work overload, it becomes clear that items WO7, 8 and 9 are all related to emotional load (Are you confronted in your work with things that affect you personally? Do you have contact with difficult people in your work? Does your work put you in emotionally upsetting situations?), while items WO1, 2, 3, 4, 5 and 6 are all related to an individual's mental capacity to do the work (Do you have too much work to do? Do you work under time pressure? Do you have to work extra hard in order to complete something? Do you have to be attentive to many things at the same time? Do you have to give continuous attention to your work? Do you have to remember many things in your work?). Within the literature, work overload is defined as being a combination of two types of load, therefore providing evidence for

a two-factor structure. Although the measurement utilised does not describe work overload as a two-factor structure, we regarded it as a two-factor structure.

It is also evident that the majority of items in the conscientiousness measurement load onto factor 2, while some also load onto factor 4. Upon investigation it was found that all reversed items, such as items 8, 18, 23 and 43, load onto factor 4, while all the positive items load onto factor 2; again supporting a two-factor structure for conscientiousness.

Workplace flexibility was found to load only onto factor 3, therefore making it a unidimensional construct with a single-factor structure. The analysis showed that the different items did not cross-load, hence indicating that each item is a reliable measure of the construct that it is designed to measure.

Table 14

Results for Horn's Parallel Analysis for the Conscientiousness, Workplace Flexibility and Work Overload Measures

Conscientiousness, Workplace Flexibility, Work Overload					
Items	**Factor 1**	**Factor 2**	**Factor 3**	**Factor 4**	**Factor 5**
Con3	0.11	-0.8	-0.02	-0.03	-0.09
Con8R	0.09	-0.14	-0.18	0.70	-0.04
Con13	0.01	-0.81	-0.16	-0.10	0.04
Con18R	0.06	0.10	-0.08	0.84	-0.05
Con23R	0.02	-0.15	0.00	0.62	0.13
Con28	0.07	-0.63	0.24	0.02	0.16
Con33	-0.11	-0.76	0.05	0.07	0.01
Con38	-0.10	-0.61	0.14	0.23	0.02
Con43R	-0.15	0.03	0.30	0.66	0.14
WO1	0.65	0.03	0.13	-0.22	0.19
WO2	0.69	0.07	0.05	-0.11	0.18
WO3	0.63	0.07	0.07	-0.15	0.24
WO4	0.80	0.07	-0.03	0.02	0.03
WO5	0.84	-0.10	-0.04	0.08	-0.05
WO6	0.79	-0.09	0.00	0.09	-0.15
WO7	-0.01	-0.05	-0.12	-0.03	0.81
WO8	0.17	0.03	-0.04	0.07	0.74
WO9	0.01	-0.02	0.01	0.02	0.88
WF1	0.08	-0.01	0.81	-0.05	-0.23
WF2	-0.02	-0.01	0.82	-0.02	0.07

Note: Con = Conscientiousness WO = Work overload WF = Workplace flexibility

4.5.4 EFA Summary and Concluding Remarks

The results obtained from the EFA support the two-factor structure of burnout. In terms of work engagement, both a two-factor and three-factor structure were analysed and, after considering the theoretical and conceptual perspectives, it was decided to keep with the original, three-factor structure. Support was also found for the univariate factor structure for workplace flexibility. Work overload and conscientiousness are intended to be univariate factor structures; however the EFA provides conflicting results to what is known about these measures. As discussed in section 4.4.3, the EFA proposed an alternative two-factor structure for work overload, split on the basis of items indicative of mental and emotional work overload, while conscientiousness was divided into two factors based on positive and negative items. Given that the factorial structure suggested for the current data should make sense from both a theoretical and conceptual perspective, it was decided to retain the two-factor structure for both work overload and conscientiousness in the subsequent analysis.

4.5.5 Additional CFA on Work Overload, Conscientiousness and Workplace Flexibility

Additional item analysis was conducted on work overload, conscientiousness and workplace flexibility after considering the two-factor structure of work overload and conscientiousness. The results from the CFA are illustrated in Table 15 and discussed below, together with the additional analysis of construct validity and standardised loading estimates. Factor loadings of between ±0.30 and ±0.4 are regarded as the minimum acceptability score while values of more than ±0.50 are regarded as necessary for practical significance (Hair et al., 2014). AVE scores greater than are regarded as indicative of adequate convergence (Hair et al., 2014), therefore the measured variables are representative of the construct they set out to measure.

Table 15

Goodness-of-Fit Statistics of the Measurement Models

Measure	Yuan-Bentler chi-square	Degrees of freedom	P-value	RMSEA	GFI	AGFI
Conscientiousness, WO & WF	325.68	161	0.00	0.068	0.860	0.818

Note: WO = Work overload WF = Workplace flexibility

The Yuan-Bentler value for the combined measures was found to be 325.68 and, when divided by the degrees of freedom, results in 2.02, which is an acceptable score, as scores below 3 are indicative of good model fit (Mîndrilă, 2010). This is already a significant indication of improved

model fit compared to the initial CFA results. Evaluating the RMSEA result of 0.068 shows reasonable fit based on the acceptability rules set out in in Section 4.4. This is a significant improvement on the previous analysis, as the fit has improved to a good fit from being a poor fit. Regarding AGFI, the value of 0.818 is close to the acceptable standard of 0.9.

For all criteria for CFA, the work overload, conscientiousness and workplace flexibility measures showed significant improvements when assessing the revised two-factor structures from the AGFI results. This indicates that the data fits the model with a two-factor structure for work overload and conscientiousness better than the traditional unidimensional conceptualisation.

Furthermore, when assessing the standardised loading estimates of the loading between items and the construct after splitting work overload and conscientiousness into subscales, the data supports the structure. Most of the loading estimates were above 0.5 and all were statistically significant ($p < 0.01$). In terms of AVE, the two work overload subscales met the requirements (0.5 and 0.61 respectively), the conscientiousness subscales were close to 0.5, with 0.44 and 0.39 respectively, while workplace flexibility was even closer to meeting the rule of thumb of 0.5 with a score of 0.49. In terms of construct reliability, all subscales met the requirements (conscientiousness = 0.79 and 0.71, work overload = 0.86 and 0.82), except for workplace flexibility, which fell just below 0.7, with 0.66, therefore not meeting the satisfactory internal consistency level. In summary, dividing work overload and conscientiousness into subscales improved the model fit.

4.6 PLS-SEM Analysis

According to Mateos-Aparicio (2011, as cited in Sarstedt et al., 2017), PLS-SEM is used to estimate the parameters of a set of equations in a structural equation model by adding principal components analysis and regression-based path analysis. This approach is known as a ‘soft model basic design’, whereas Jöreskog’s (1973, as cited in Sarstedt et al., 2017) traditional factor-based SEM or covariance-based SEM is regarded as a hard modelling. PLS-SEM has grown very popular because it allows the estimation of complex models with many constructs and indicator variables, particularly when prediction is the focus of the analysis. PLS-SEM also allows more flexibility regarding data requirements and the condition of the relationships between constructs and indicator variables (Sarstedt et al., 2017).

The PLS-SEM consists of a two-stage process. The first stage entails assessing the outer model to determine its reliability and validity (Ab Hamid et al., 2017). Once this has been established, the second stage is to evaluate the inner model, which in this case is the structural model.

4.6.1 Outer Model Evaluation

As discussed previously, the outer model was evaluated to determine the validity and reliability of the measurement model. Composite reliability was used to determine the internal consistency, while convergent validity was determined by AVE scores and discriminant validity was determined with the HTMT criterion (Hair et al., 2014 as cited in Ab Hamid et al., 2017). The results are discussed in the sections that follows.

4.6.1.1 Composite Reliability

Composite reliability is used to measure the internal consistency reliability of latent variable scales. The rule of thumb is to consider values of equal to or greater than 0.7 as satisfactory (Peters, 2014). All composite reliability scores were found to be satisfactory (> .70) as can be seen in Table 16 below. This shows that the five measures did in fact measure what they had to.

4.6.1.2 AVE values

AVE values above .50 (Hair et al., 2014) can be regarded as indictive of convergent validity. From the results (see Table 16) it is clear that only one (workplace flexibility) of the five main measures show convergent validity. The main work overload and work engagement measures could possibly be included, as they were very near to the acceptable cut-off for work overload (0.47) and work engagement (0.48). The two subscales of work overload were well above the .50 cut-off, with 0.58 and 0.74, therefore indicating convergent validity. The work engagement subscales had mixed convergent validity, as absorption was very close to the 0.5 value, with 0.48, and therefore could be included. Dedication definitely met the 0.5 value, with 0.68, while vigour also met the minimum cut-off of 0.5, with a value of 0.51. Conscientiousness was the measure that did not display convergent validity, which could be interpreted as that conscientiousness only explained 37% of the variance in the measurement items. However, it is clear from the subscales that conscientiousness displayed convergent validity (0.53 and 0.55 respectively).

Finally, the burnout measure itself did not display convergent validity (0.38), although the two subscales both fell just below the acceptability level for convergent validity, with 0.48 each.

In conclusion, given that AVE is a stricter form of assessing reliability, the statistical investigation continued.

Table 16

Composite Reliabilities and AVE of Measures

Measure	Composite reliability	AVE values
Conscientiousness	0.84	0.37
Conscientiousness negative items	0.82	0.53
Conscientiousness positive items	0.86	0.55
Work engagement	0.94	0.48
Work engagement_absorption	0.84	0.48
Work engagement_dedication	0.91	0.68
Work engagement_vigor	0.86	0.51
Workplace flexibility	0.84	0.73
Work overload	0.89	0.47
Work overload item 1	0.89	0.58
Work overload item 2	0.89	0.74
Burnout	0.90	0.38
Burnout_disengagement	0.88	0.48
Burnout_exhaustion	0.88	0.48

4.6.1.3 HTMT ratios

Discriminant validity indicates the degree to which constructs differ from each other. The HTMT ratio method is a superior method, as it is able to achieve higher specificity and sensitivity rates compared to other methods (Henseler et al., 2015, as cited in Ab Hamid et al., 2017). According to Ab Hamid et al. (2017), HTMT values of more than 1 indicate a lack of discriminant validity. Other researchers suggest 0.85 (Kline, 2011, as cited in Ab Hamid et al., 2017) and 0.90 (Gold & Arvind Halhotra, 2001, as cited in Ab Hamid et al., 2017) as the threshold. Of the 91 pathways investigated and taking into account all the possible combinations due to the subscales of work engagement, burnout, workplace flexibility and conscientiousness, only 10 pathways were found to be non-satisfactory according to the guidelines set out above. These 10 pathways can be seen in Table 17 below. The remainder of the pathways were all satisfactory and displayed discriminant validity.

Table 17

HTMT Ratios of the Measures

Pathway	HTMT Ratio	95% lower	95% upper	Discriminant
Conscientiousness → Conscientiousness negative emotion	1.03	0.96	1.14	no
Conscientiousness → Conscientiousness positive emotion	1.1	1.04	1.22	no
Work engagement dedication → Work engagement absorption	0.97	0.92	1.02	no
Work engagement vigour → Work engagement dedication	0.96	0.9	1.01	no
Work overload → Work overload item 1	1.08	1.05	1.11	no
Burnout disengagement → Burnout	1.03	1.00	1.05	no
Burnout exhaustion → Burnout	1.03	1.00	1.05	no
Work engagement → Work engagement absorption	1.08	1.05	1.11	no
Work engagement → Work engagement dedication	1.04	1.02	1.06	no
Work engagement → Work engagement vigour	1.07	1.04	1.09	no

4.6.1.4 Outer Loadings

The final step in evaluating the reliability of the items was to examine the outer loading using PLS bootstrapping analysis, using a 95% confidence interval. According to Babbie and Mouton (2001), if zero falls between the 95% confidence interval it is regarded as insignificant, while if zero falls outside the item loading it is regarded as significant. Furthermore, p-values for the t-test were investigated, with values lower than 0.5 regarded as statistically significant at the 95% confidence interval (Kock, 2015).

The results of the evaluation were investigated and it was found that all paths were statistically significant, as zero did not fall between the 95% confidence interval and all p-values were below 0.5. This indicated the reliability of the latent variable scales.

4.6.1.5 Outcome of the outer model

The latent variables displayed satisfactory validity and reliability after carefully considering the results of the composite reliability, AVE values, HTMT ratios and outer loadings. Given the satisfactory indication of the reliability and validity of the measurement model, the second stage of the PLS-SEM could be undertaken, viz. the evaluation of the inner model (structural model).

4.6.2 Evaluation of the inner model

The quality of the relationships between the latent variables in the structural model was determined by evaluating the inner model fit. Inner model fit estimates that were evaluated in this regard were

multicollinearity, coefficient of determination, and the path coefficients of the hypothesised relationships. Each of these is discussed separately in the sections below.

5.6.2.1 Test of Multicollinearity

Multicollinearity is indicative of the degree to which the effects of a variable can be explained by those of another. As the occurrence of multicollinearity increases, it becomes increasingly more difficult to determine whether the noticed effects of one variable on another are due to interrelationships. To test multicollinearity, variance inflation factor (VIF) coefficients were calculated and evaluated. Larger VIF values are indicative of multicollinearity among the predictors, and the general rule of thumb for VIF values is 10 (Hair et al., 2014). More recently, however, Hair et al. (2019) indicated that, when testing for collinearity, VIF scores and scores above 5 indicate collinearity issues and VIF values of close to 3 and lower would be preferred.

The results of the test showed that all VIF values were either equal to or just above the acceptable cut-off of 1, therefore indicating a lack of multicollinearity and no problems in terms of multicollinearity.

5.6.2.2 Coefficients of determination (R^2)

Coefficients of determination (R^2) indicate the proportion of variance of the dependent variable about its mean that is explained by the indicator variable (Hair et al., 2014). R^2 values range between 0 and 1, and the higher the value, the greater the explanatory power of the regression equation and thus its predictive accuracy. According to Hair et al. (2011, as cited in Hair et al., 2019), R^2 values of 0.75 are substantial, 0.5 moderate and 0.25 weak. The adjusted coefficient of determination incorporates the number of independent variables and sample size, therefore giving a modified measure knows as the adjusted R^2. Despite the addition of independent variables, leading to an increase in the coefficient of determination, the adjusted coefficient of determination can be lowered by the presence of independent variables with little explanatory power or in the event that the degrees of freedom become too small (Hair et al., 2014).

Table 18 shows that the R^2 and adjusted R^2 values for most of the dependent variables were the same; however, the adjusted R^2 was lower for burnout, the disengagement subscale of burnout and work engagement. Only chronotype was found to have a very low R^2 value that can be considered extremely weak; burnout had an R^2 value of 0.26, which is just above the cut-off of 0.25 for weak R^2 values. The remainder of the results all range from moderate to substantial. The negative items

for the conscientiousness dimension indicated lower R^2 than the positive items, with 55% and 78% of the variance in the dimension being explained by the effect of exogenous variables respectively. All three work engagement dimensions indicated very good R^2 scores, with 85% (absorption), 90% (dedication) and 86% (vigour) of variance being explained by the effects of exogenous variables. The work engagement construct itself, with 0.57, did not have R^2 values as good as the subscales. According to the guidelines set out by Hair et al. (2011, as cited in Hair et al., 2019), this value can be regarded as just above moderate. Work overload also indicated good R^2 scores of 0.83 and 0.59 for the work overload factor 1 and factor 2 dimensions respectively. While the burnout construct had weak R^2 scores, the two dimensions of burnout, viz. disengagement and exhaustion, showed very good R^2 scores of 0.81 for both dimensions. The low score for chronotype is indicative that there possibly are other variables outside the scope of this study that influenced the variable.

Table 18

R^2 and Adjusted R^2 Values of the Measures

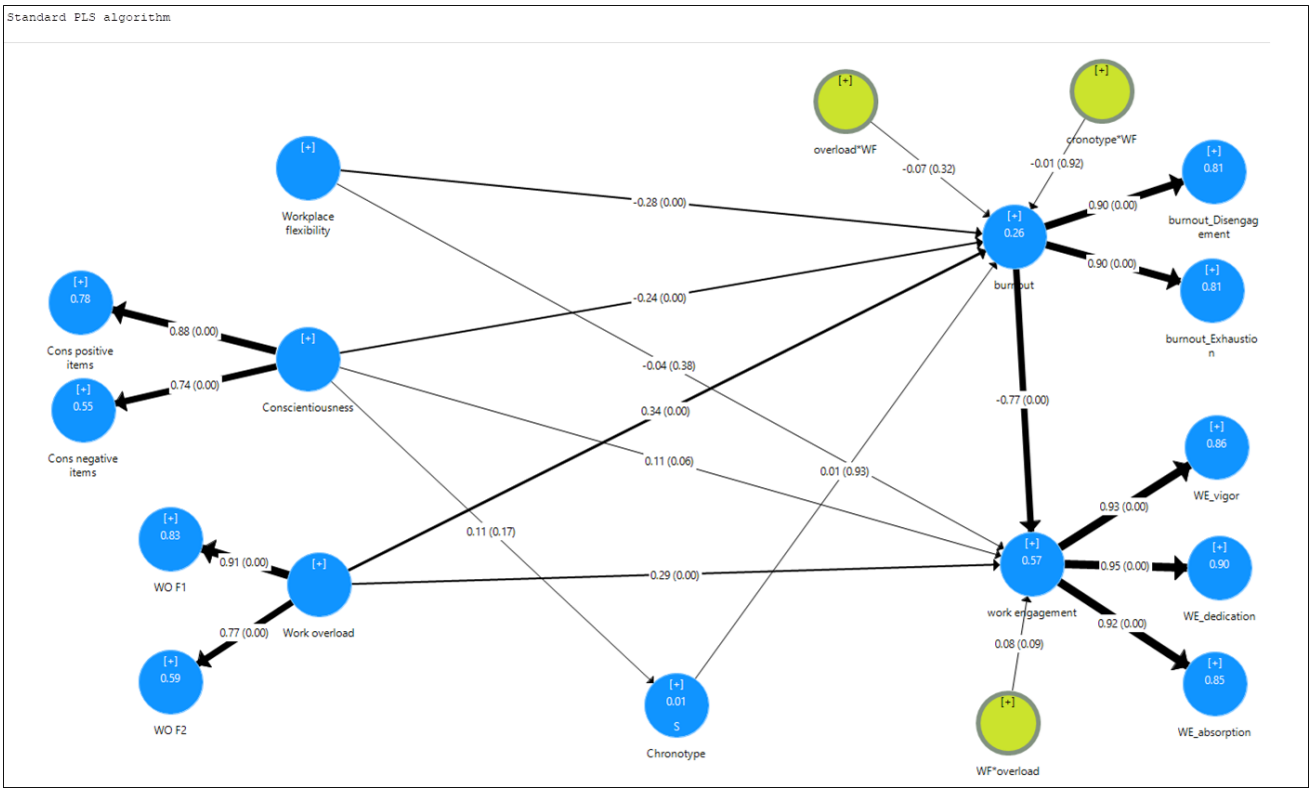
Construct	Coefficient of determination	Adjusted coefficient of determination
Chronotype	0.01	0.01
Conscientiousness negative items	0.55	0.55
Conscientiousness positive items	0.78	0.78
Work engagement	0.57	0.56
Work engagement_Absorption	0.85	0.85
Work engagement_Dedication	0.90	0.90
Work engagement_Vigor	0.86	0.86
Work overload item 1	0.83	0.83
Work overload item 2	0.59	0.59
Burnout	0.26	0.24
Burnout_Disengagement	0.81	0.80
Burnout_Exhaustion	0.81	0.81

5.6.2.3 Decision regarding the inner model

The hypothesised relationship was found to be statistically significant after evaluating the inner model fit. A summary of the inner model fit is illustrated in Figure 7 below.

Figure 7

PLS Model



As can be seen in Figure 7, the variables in the structural model explain some of the variance in the work engagement and burnout levels of knowledge workers. Some of the path coefficients in the emerging structural model were found to be significant, while others were not statistically significant. The path coefficients that were found not to be statistically significant are summarised in Table 19 below. All pathways (main effects) shown in Table 19 have low path coefficients and previously were found to have high R^2 values, with the exception of chronotype and burnout. This indicates the possibility of missing variables, or that other variables beyond the scope of this study had an influence on the interactions between these variables. The interpretation of the significant hypothesised relationships (main effects) is provided next.

Table 19

Main Pathways Found not to be Statistically Significant

Hypothesis	Pathway	Significant	Path coefficient
Hypothesis 1	Chronotype → Burnout	No (p = 0.93)	0.01
Hypothesis 2	Conscientiousness → Chronotype	No (p = 0.17)	0.11
Hypothesis 5	Workplace flexibility → Work engagement	No (p = 0.38)	-0.04

The structural model investigated was based on hypothesised relationships that originated from a thorough literature review of the constructs of the model (see Chapter 2). Path coefficients were produced from the statistical analysis and can be used to determine the strength, significance and direction of these hypothesised relationships. Each of these hypothesised relationships is discussed below. As indicated in Table 18, hypotheses 1, 2 and 5 were found to be not statistically significant, and key points related to these findings are highlighted next.

Regarding hypothesis 1, it is important to realise that, while the relationship might not have been significant in the present study, sleep studies focusing on all aspects of sleep have grown increasingly important, as research indicates that sleep holds vital benefits or consequences for performance and well-being, specifically in relation to burnout. Chronotype can also be argued to fit into this category of sleep research, as it is indicative of sleep-time preference. Some of the research findings indicate that insufficient sleep and thoughts of work during leisure time and high work demands are risk factors for the development of burnout (Söderström et al., 2012), while other studies related to sleep quality and length in relation to stress and burnout show that the relationship between stress and exhaustion was weaker among students reporting good-quality sleep compared to those with poor-quality sleep. The relationship between stress and exhaustion lessened as sleep duration increased. These findings serve as indications of the value of investigating all aspects of sleep in relation to burnout and performance.

Hypothesis 2 was also found to be non-significant, which is surprising given the abundance of findings supporting the existence of this relationship (see Section 2.5.2). However, the findings indicate only that there was no relationship between the two variables in the present study, but this is not generalisable beyond the sample group of this study.

Hypothesis 5 tested the relationship between workplace flexibility and work engagement, and it was found that, unlike the literature discussed in Section 2.5.5, the relationship in the current study was non-significant. Looking at the research findings of Pitt-Catsouphes and Matz-Costa (2008),

it is possible that no relationship was found between workplace flexibility and work engagement because the median employee in this particular study was 35 years of age, with those falling in the category of 20 to 30 were the highest represented age group, at 36%.

5.6.2.4 Interpretation of significant main hypotheses

The remainder of the main hypothesis were all found to be statistically significant and will each be discussed in the section below by reporting on the results found for the relationship as well as support for the relationship from the recent literature.

Hypothesis 3: Conscientiousness has a significant positive relationship with work engagement

The hypothesised positive relationship of conscientiousness with work engagement was found to be statistically significant (path coefficient = .11; $p = 0.06$, therefore not significant at 5% but significant at 10%, indicating a trend). The findings of this study therefore support the findings in the literature, as discussed in section 2.5.3. The most recent study of this relationship discussed in section 2.5.3 found a positive relationship between conscientiousness and work engagement ($\beta = 0.336$, $p < 0.001$) in 713 employees of six different companies in Belgium (school, chemical production company, three social health care organisations and local police) (Janssens et al., 2019).

The results indicate that knowledge workers with high conscientiousness also indicated high levels of work engagement levels and those with low conscientiousness had associated low levels of work engagement.

Hypothesis 4: Conscientiousness has a significant negative relationship with burnout

The hypothesised negative relationship of conscientiousness with burnout was found to be statistically significant (path coefficient = -.24; $p < 0.01$). The results indicate that knowledge workers with high conscientiousness were found to have low levels of burnout, whereas those with low conscientiousness had high levels of burnout. The findings of this study therefore support the findings in the literature, as discussed in section 2.5.4. Furthermore, a recent study of a sample of 1 236 nurses, who can also be regarded as knowledge workers, found that burnout was correlated negatively with conscientiousness ($r = -.20$, $p < 0.001$), therefore further supporting the findings of the current study. The results therefore indicate that the existence of burnout in the sample group is associated negatively with conscientiousness, among other personality traits (Pérez-Fuentes et al., 2019).

Hypothesis 6: Workplace flexibility has a significant negative relationship with burnout

The hypothesised negative relationship of workplace flexibility with burnout was found to be statistically significant (path coefficient = -.28; $p < 0.01$). The findings therefore support the findings in the literature, as discussed in section 2.5.5. The results indicate that knowledge workers with high workplace flexibility also experience low levels of burnout and those with low levels of workplace flexibility experience high levels of burnout.

Hypothesis 7: Burnout has a significant negative relationship with work engagement

The hypothesised negative relationship of conscientiousness with work engagement was found to be statistically significant (path coefficient = -.77; $p < 0.01$). The results indicate that knowledge workers with high levels of burnout also had low levels of work engagement, and those with low levels of burnout also had high levels of work engagement.

The findings of this study therefore support the findings in the literature, as discussed in section 2.5.7. Most recently, a study found a negative relationship between work engagement and burnout (path coefficient = -0.95) in a sample of 219 nursing staff (Contreras et al., 2020), therefore supporting the findings of the present study

Hypothesis 8: Work overload has a significant positive relationship with burnout

The hypothesised positive relationship of work overload with burnout was found to be statistically significant (path coefficient = 0.34; $p < 0.01$). The findings therefore support the literature. Knowledge workers with high work overload also had high levels of burnout, and those with low levels of work overload experienced low burnout. These findings are in line with those discussed in section 2.5.8, and similar findings have recently been found in the research of Bachmann (2019), with burnout having a significantly positive correlation with work overload ($r = .408$, $p < .01$).

5.6.2.5 Interpretation of the moderating hypotheses

Two approaches were utilised to test the significance of the moderating effects. The first was an R^2 change test for interaction that used three variables, viz. the independent, moderator and dependent variables. This test was done to see if R^2 would increase significantly when the interaction between the independent and moderating variables was included. The change in R^2 was interpreted together with the p-value to determine whether moderating effects exist. P-values are significant at $p < 0.05$ (95% confidence interval). The results of this test are depicted in Table 20. None of the moderating hypotheses were significant at $p < 0.05$. However, given that hypothesis

11 had a p-value of 0.07, which is just above the acceptability level, it was decided to interpret hypothesis 11 as significant.

Table 20

Results of R^2 Change Test for Moderating Hypothesis

Hypothesis	Pathway	p-value	R^2 Changed	F- to remove
Hypothesis 9	Chronotype*Workplace flexibility → Burnout	P=0.82	-0.02%	0.05
Hypothesis 10	Work overload*Workplace flexibility → Burnout	P= 0.24	-0.52%	1.40
Hypothesis 11	Workplace flexibility*Overload → Work engagement	P=0.07	-1.48%	3.32

The second test utilised path coefficients of interaction terms that were included in the PLS model to determine the strength, significance and direction of the hypothesised moderating effects in the structural model. Significance is determined by whether zero falls between the lower and upper bootstrapping values. In this study, the analysis was done at the 95% confidence interval. The results presented in Table 21 are discussed below.

Table 21

Moderating Path Coefficients of PLS Model

Hypothesis	Pathway	p-value	Path coefficient
Hypothesis 9	Chronotype*Workplace flexibility → Burnout	p= 0.92	-0.01
Hypothesis 10	Work Overload*Workplace flexibility → Burnout	p= 0.32	-0.07
Hypothesis 11	Workplace flexibility*Overload → Work engagement	p= 0.09	0.08

Hypothesis 9: Workplace flexibility buffers the relationship between chronotype (eveningness) and burnout

The results depicted in Table 20 and Table 21 indicate that the moderating effect of workplace flexibility on the relationship between chronotype and burnout is not statistically significant and therefore the findings of this study do not support the existence of this relationship in the study sample. The hypothesis originated from a recommendation from the research by Bellicoso et al. (2014), as discussed in section 2.6.1, which suggested that introducing workplace flexibility would help nurses to accommodate their chronotype and therefore deal with the detrimental effects on their burnout levels.

Hypothesis 10: Workplace flexibility moderates the relationship between work overload and burnout such that the relationship is weakened

The results depicted in Table 20 and Table 21 indicate that the moderating effect of workplace flexibility on the relationship between work overload and burnout is not statistically significant and therefore the findings of this study do not support the existence of this relationship in the study sample. Based on the premises of the job-demands resources model, the hypothesis was constructed in theory and was to be tested to find support for it; however, support was not found for this relationship in the current study and within the specific sample group.

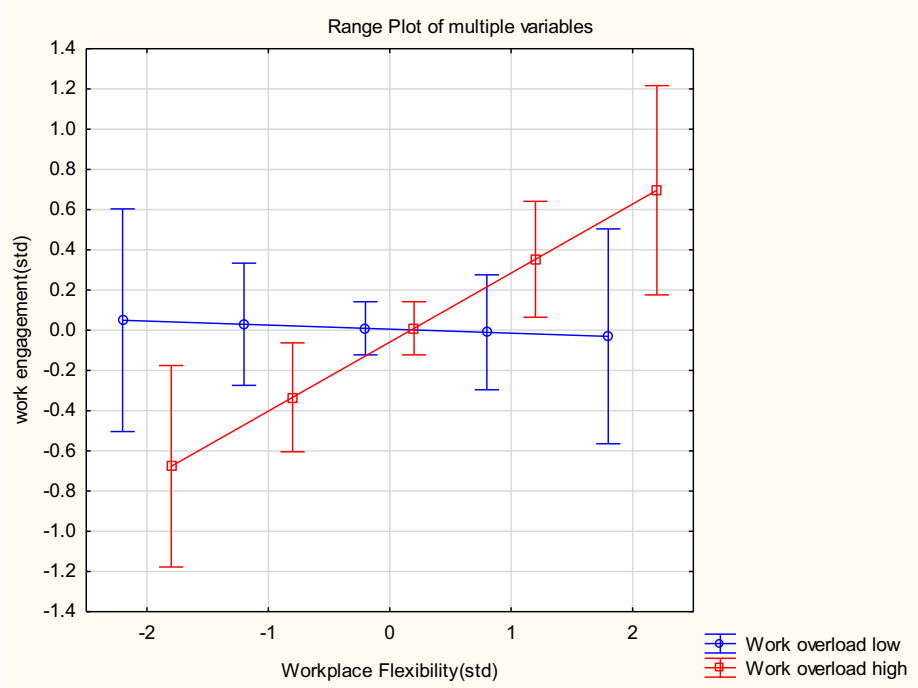
Hypothesis 11: Work overload moderates the relationship between workplace flexibility and work engagement such that the relationship is strengthened

The results depicted in Table 20 and Table 21 indicate that, for the R^2 change test (Table 20), the significance level is just marginally outside the significance indicator of $p < 0.05$ but falling within the significance level of 10% ($p=0.07$, $p<0.1$) and therefore these findings can be viewed as trending towards statistical significance. Therefore, the data supports the moderating effect of work overload on the relationship between workplace flexibility and work engagement to some degree. Furthermore, evaluating the results depicted in Table 21, the results of hypothesis 11 falls within the acceptability of significance if $p < 0.1$ is utilised as the indicator of significance, and therefore the data also supports the hypothesis that work overload moderates the relationship between workplace flexibility and work engagement.

Work overload as a moderator of the relationship between workplace flexibility and work engagement is represented in Figure 8 below. The figure indicates that, when the work overload of knowledge workers is low, workplace flexibility has a lower impact on work engagement, whereas when work overload levels are high, workplace flexibility has a greater effect on their work engagement levels. While there is no empirical evidence in the literature to support these findings, these finds are consistent from a theoretical perspective with proposition 4 of the JD-R model, which proposes that, during times of high job demands, job resources such as workplace flexibility are instrumental for motivation, as indicated in the work engagement construct. During times of high work overload, knowledge workers can utilise their workplace flexibility resources to stay motivated and engaged in their work.

Figure 8

The Moderating Effect of Work Overload on the Relationship Between Workplace Flexibility and Work Engagement



4.7 Chapter summary

Chapter 4 has presented and discussed the statistical results of the various analyses. Firstly, item analysis and CFA were performed on the data to determine the validity and reliability of the latent variable scales used to collect the empirical data. Based on the CFA results, it was found that further analysis is required with EFA, as the measurement model had poor fit. The observed data did not adequately represent the theoretical factor structure of the latent variables. EFA was used to investigate the factor structure of the constructs. The outcome of the EFA indicate that the various scales had different factorial structures to those proposed by the authors. The conscientiousness scale, as well as the work overload scale, was found to have a two-factor structure. Considering both the theoretical underpinning of and the conceptual foundations for the construct, the two factor structures for work overload and conscientiousness were used for the subsequent analysis. Additional CFA analysis was done, considering the subscales for work overload and conscientiousness. These findings indicate that the data supports the new structure, and therefore this structure was used for further analysis. Given that the measurements utilised for the purpose of this study are well-known and popular instruments in studies in the field of

Industrial Psychology, the poor fit found when doing the CFA as well as the subsequent EFA was not cause for alarm. The measurement instruments have already been shown in numerous other studies to be valid and reliable measurements. In the present study, the findings of poor fit are indicative of participants potentially not understanding the questions, rushing to complete the questionnaire, not paying appropriate attention to the questions or randomly selecting answers. This could be attributed to the questionnaire in potentially being too long or time-consuming to complete.

PLS-SEM was performed as an additional analysis to investigate the accuracy and consistency of the structural model. To do this, both the outer model and inner model fits were assessed, together with path coefficients, to determine the strength and significance of the hypothesised relationships between the latent variables of the structural model. Two of the moderating hypotheses were found not be statistically significant. Support for the relationships between latent variables was found for most of the main effects, which indicates that the hypothesis supports the theoretical framework. Hypotheses 1, 2 and 5 were unsupported. The R^2 change test and path coefficient analysis of the interaction terms were done to evaluate the moderating effects. The results of these tests found that only one hypothesised moderating effect was statistically significant, viz. the moderating effect of work overload on the relationship between workplace flexibility and work engagement.

Following the outcome of Chapter 4, Chapter 5 addresses the limitations of the study, the implications for practice and managers, and recommendations for future research.

CHAPTER 5

IMPLICATIONS, LIMITATIONS AND RECOMMENDATIONS FOR FUTURE RESEARCH

5.1 Introduction

The current research study aimed to answer the question on the difference in variance among knowledge workers in terms of their burnout and work engagement levels. JDR theory was used as a framework to investigate this research aim. The focus was on job demands (work overload) and job resources (workplace flexibility), with conscientiousness as a personal resource for the purpose of the study and chronotype being introduced as a special variable.

Based on the findings, which were discussed at length in Chapter 4, this chapter focuses on the managerial and practical implications of these findings, as well as research limitations. It also makes recommendations for enhancements/improvements and practical advice for future endeavours on this topic.

5.2 Practical and Managerial Implications

5.2.1 Work overload and workplace flexibility as intervention targets to minimise burnout

The research indicates that chronotype is not a factor that needs to be considered when designing interventions for a reduction in the burnout levels of knowledge workers, given that insignificant relationships were found between chronotype and burnout levels. However, as will be discussed further on in this chapter, although the present study did not find support for chronotype as a factor to consider in the work engagement and burnout of knowledge workers, there is sufficient research in the literature to suggest that this topic remains important and should be researched and explored further. The present research seems to suggest that chronotype is not to be considered in burnout and work engagement interventions.

In this study, it was found that work overload results in the burnout of knowledge workers, therefore it is important to ensure that employees have adequate training and competencies to execute the tasks that are assigned to them, and to ensure that they are not overloaded with work tasks. A suggestion is to tailor the quantity of work to the employee's capacity, which potentially could relieve the work overload of employees and thereby minimise its impact on burnout, since burnout also results in reduced levels of work engagement. Controlling the antecedents of burnout therefore is important.

The findings indicate a moderating effect of work overload on the relationship between workplace flexibility and work engagement. When work overload is high (due to operational requirements), employees could sustain their level of work engagement if workplace flexibility practices are in place. Allowing employees to make use of workplace flexibility practices such as choosing their working hours or working from home will provide them with the resources they need to balance their priorities in order to stay motivated and continue to deliver work with the same amount of vigour, dedication and absorption.

Workplace flexibility also serves as an important method to reduce the burnout of knowledge workers, even without the presence of work overload. Workplace flexibility allows employees to arrange their personal and work tasks in such a manner that there is balance between the two, thereby helping to protect employees against burnout. Introducing workplace flexibility practices and providing employees with the option to utilise these practices could be an important intervention to prevent burnout among employees.

As also indicated by previous research, this research supports the statement that burnout has a detrimental effect on the level of work engagement of knowledge workers. Interventions therefore should be tailored to prevent burnout from taking hold of knowledge workers, as this will have a negative effect on their levels of work engagement and inevitably will result in negative consequences for the organisation, teams and the individuals themselves.

5.2.2 Recruitment and selection

Knowledge-based organisations should take care during the recruitment and selection phase to employ knowledge workers with high levels of conscientiousness, as these individuals will have inherent protection against burnout. Those high in conscientiousness will naturally also be higher in work engagement. It is recommended that, when recruiting knowledge workers, psychometric assessments should be part of the recruitment process to identify those individuals scoring high on conscientiousness.

5.3 Limitations and future recommendations of the study

Several limitations could be identified in the current study, although this does not deter from the significance of the research findings discussed in Chapter 4.

5.3.1 Data collection and sampling technique

The current study used a snowball sampling method together with convenience sampling. These methods hold a disadvantage, as the representation may be skewed in that the researcher is unable to manage representation in relation to the target population. Furthermore, using online surveys is useful for ensuring anonymity; however, this also limited the researcher's ability to assess whether the participants met the criteria, even though additional screening questions were asked in an effort to prevent participants who were not eligible from participating and the researcher only sent out invitations to individuals who already met the criteria. Future studies could use sampling techniques that enable the researcher to find sample groups that are undoubtably representative of the target population, such as approaching organisations known to employ knowledge workers or in knowledge-intensive work sectors.

5.3.2 Chronotype construct within I/O psychology research

In the discussion of hypothesis 1 in section 6.2.4, arguments were made for the importance of chronotype research and its value for the field of Industrial Psychology. A possible limitation of the chronotype construct in the current study is its novelty within the field. While the MEQ has been validated against biological variables as well as sleep diaries of morning-type and evening-type individuals, making it a viable measurement of chronotype preference, it still is researched primarily in the biological sciences. Having a greater body of literature and previous studies to analyse could have resulted in a better understanding of the nomological network surrounding the chronotype measurement, thereby potentially resulting in a different set of variables to investigate. This possibly could have led to significant pathways involving the chronotype variable. Very few studies have investigated this construct in relation to well-being constructs, therefore recommendations for future research are to continue building on the current body of knowledge. Related to this limitation and recommendation is the next point of discussion, viz. how chronotype is investigated and in which form it is introduced into research.

5.3.3 Chronotype and the sample group

The current study identified chronotype as the factor under investigation in the model. However, this limited the deductions that could be made from the research, as the sample group was limited to knowledge workers who could not be classified as morning-type or evening-type knowledge workers. Recommendations for future research would be to split the participants into two types of knowledge workers, based on the outcome of the chronotype measure, as either morning-type or

evening-type, and then doing a multigroup analysis to compare the two groups to each other in terms of a specified model and seeing whether there would be any significant differences. Splitting the sample into three groups to condense the original five groups into three, therefore collapsing the definite evening and moderate evening types into evening types, and the same for morning types, would require additional considerations in terms of sample size, as each group will have to be equally represented to be able to interpret the results.

While the MEQ is known as the golden standard for measuring chronotype, it does have some limitations and care should be taken when classifying a sample group into the different categories, as chronotype preference differs across gender groups and also adjusts through an individual's life span. Age therefore should be an important factor to consider when dividing a sample group into categories (Levandovski et al., 2013). The MEQ was originally validated using a sample of individuals aged 18 to 32, mostly comprising young students, therefore the aim of the research by Taillard, Phillip, Chastang and Bioulac (2004) was to adapt and standardise the MEQ to an active, middle-aged population.

While multigroup analysis to compare different categories based on chronotype is called for, care should also be taken during the execution of this research recommendations to ensure that chronotype preferences in age and gender groups are considered.

5.3.4 Utilising self-reports to measure variables

Using self-reports as the only measure of the variables in the current study could be regarded as a limitation, given the possibility of common-method bias, where variance in the responses is due to the measurements as opposed to the actual predisposition of the participants. Furthermore, self-reports as a measurement tool have the potential for response bias, in terms of which participants respond and skew the data towards how they would like to be perceived or what they perceive to be the response that is socially appropriate or desired by the researcher, rather than their actual behaviour, perceptions or feelings. The possibility therefore exists that the participants did not respond honestly to the measurement items. Recommendations for future research to potentially prevent the presence of response bias is to have other methods of assessing the participants' views of the same construct that are more objective, such as co-worker or managerial perceptions of the participants' views on the variables under investigation.

5.3.5 Language and interpretation barriers

The survey was only available in English, which could have resulted in potential language barriers, leading to participants misinterpreting the statements and providing inaccurate and invalid responses. Participants who are not as proficient in English could have had even greater difficulty in answering the reverse-item questions that were negatively phrased. A recommendation for future research would be to have the survey available in a variety of languages, and also to develop and validate the measures for a South African context.

5.3.6 Missing values

The presence of missing values that needed to be addressed in the current study could be regarded as a limitation. The construction of the online survey allowed participants to decide whether they wanted to answer every item. Items therefore were non-mandatory, resulting in missing values. Missing values were addressed, and 218 viable samples were found that could be used for data analysis. Choosing to have items as non-mandatory posed a definite and identified risk of missing values. However, the researcher placed emphasis on the freedom for participants to choose whether they would like to respond, thereby not forcing responses. Recommendations for future research in relation to missing values would be to explore options that would allow employees the freedom to choose whether they would like to answer specific items while also limiting the potential for missing values.

5.4 Chapter Summary

The purpose of the current research study was to investigate factors that cause variance in the work engagement and burnout levels of knowledge workers in South Africa. The foundation of the proposed model originated from the job-demands resources theory, with work overload under investigation as a job demand, workplace flexibility as a job resource, conscientiousness as a person resource and chronotype as a special variable. All proposed main relationships were found to be statistically significant, with the exception of hypothesis 1 (chronotype → burnout) and hypothesis 2 (conscientiousness → chronotype), which are considered with the chronotype construct, and lastly hypothesis 5 (workplace flexibility → work engagement). Therefore, the findings mostly support the use of the variables under investigation in the context of job-demands resources theory. In terms of moderating relationships, the results indicate a tendency for work overload to moderate the relationship between workplace flexibility and work engagement, while the other two moderating relationships were not found to be statistically significant.

This research contributes to the literature in terms of expanding the existing knowledge of variables affecting work engagement and burnout by the variables under investigation in the current research study. Furthermore, the research implications for line managers and the practical application thereof by organisations, together with recommendations for future research, indicate that this study is of value.

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APPENDIX A

UNIVERSITEIT
STELLENBOSCH
UNIVERSITY

APPROVED WITH STIPULATIONS
REC: Social, Behavioural and Education Research (SBER) - Initial Application Form

13 February 2020

Project number: IPSY-2020-11590

Project title: Exploring chronotype, conscientiousness, workplace flexibility and work overload within the Job Demands–Resources model.

Dear Miss Tanya Meyer

Your REC: Social, Behavioural and Education Research (SBER) - Initial Application Form submitted on 12 January 2020 was reviewed by the REC: Humanities and approved with stipulations.

Ethics approval period:

Protocol approval date (Humanities)	Protocol expiration date (Humanities)
13 February 2020	12 February 2023

PLEASE RESPOND TO THE FOLLOWING STIPULATIONS:

The researcher may proceed with the envisaged research provided that the following stipulations, relevant to the approval of the project are adhered to or addressed:

1) With reference to section 6.2.1: Please include more of a justification for each of the variables included. Why for example will the variable, 'race' be needed in this study? [RESPONSE REQUIRED]

2) With reference to section 6.12: The consent form must include that the data will be stored for future use. [RESPONSE REQUIRED]

HOW TO RESPOND:

Some of these stipulations may require your response. Where a response is required, you must respond to the REC within **three (3)** months of the date of this letter. Your provisional approval will be withdrawn automatically should your response not be received by the REC within 3 months of the date of this letter.

For instructions on how to respond to these stipulations, please download the FAQ on how to edit your application and follow the steps carefully: HOW TO RESPOND TO REC FEEDBACK.

Where revision to supporting documents is required, please ensure that you replace all outdated documents on your application form with the revised versions.

Please take note of the General Investigator Responsibilities attached to this letter. You may commence with your research after complying fully with these guidelines.

If the researcher deviates in any way from the proposal approved by the REC: Humanities, the researcher must notify the REC of these changes.

Please use your SU project number (11590) on any documents or correspondence with the REC concerning your project.

Please note that the REC has the prerogative and authority to ask further questions, seek additional information, require further modifications, or monitor the conduct of your research and the consent process.

FOR CONTINUATION OF PROJECTS AFTER REC APPROVAL PERIOD

Please note that a progress report should be submitted to the Research Ethics Committee: Humanities before the approval period has expired if a continuation of ethics approval is required. The Committee will then consider the continuation of the project for a further year (if necessary)

Included Documents:

Document Type	File Name	Date	Version
Proof of permission	Permission to use MEQ for Tanya Meyer at Stellenbosch University in South Africa	31/10/2019	1
Proof of permission	Permission to use JD-R scale	06/11/2019	1
Proof of permission	Permission to use Perceived Workplace Flexibility items	06/11/2019	1
Proof of permission	Permission to use_BFI	06/11/2019	1
Proof of permission	Permission to use_OLBI	06/11/2019	1
Proof of permission	Permission to use_UWES	06/11/2019	1
Data collection tool	T. Meyer - All Measurement Items_Final	06/11/2019	2
Research Protocol/Proposal	Tanya Meyer - Revised Proposal Submission_2019_12_17 Post Turnitin	17/12/2019	4
Recruitment material	Tanya - Invitation letter - Revision 1	18/12/2019	3
Informed Consent Form	Tanya - Informed consent form - Revision 2	12/01/2020	3
Default	T. Meyer Changes made to Informed Consent Form	12/01/2020	1
Default	Tanya - Informed consent form - Revision 2	12/01/2020	2

If you have any questions or need further help, please contact the REC office at cgraham@sun.ac.za.

Sincerely,

Clarissa Graham

REC Coordinator: Research Ethics Committee: Human Research (Humanities)

National Health Research Ethics Committee (NHREC) registration number: REC-050411-032.
The Research Ethics Committee: Humanities complies with the SA National Health Act No.61 2003 as it pertains to health research. In addition, this committee abides by the ethical norms and principles for research established by the Declaration of Helsinki (2013) and the Department of Health Guidelines for Ethical Research: Principles Structures and Processes (2nd Ed.) 2015. Annually a number of projects may be selected randomly for an external audit.

Investigator Responsibilities

Protection of Human Research Participants

Some of the general responsibilities investigators have when conducting research involving human participants are listed below:

1. Conducting the Research. You are responsible for making sure that the research is conducted according to the REC approved research protocol. You are also responsible for the actions of all your co-investigators and research staff involved with this research. You must also ensure that the research is conducted within the standards of your field of research.

2.Participant Enrollment. You may not recruit or enrol participants prior to the REC approval date or after the expiration date of REC approval. All recruitment materials for any form of media must be approved by the REC prior to their use.

3.Informed Consent. You are responsible for obtaining and documenting effective informed consent using **only** the REC-approved consent documents/process, and for ensuring that no human participants are involved in research prior to obtaining their informed consent. Please give all participants copies of the signed informed consent documents. Keep the originals in your secured research files for at least five (5) years.

4.Continuing Review. The REC must review and approve all REC-approved research proposals at intervals appropriate to the degree of risk but not less than once per year. There is **no grace period.** Prior to the date on which the REC approval of the research expires, **it is your responsibility to submit the progress report in a timely fashion to ensure a lapse in REC approval does not occur.** If REC approval of your research lapses, you must stop new participant enrollment, and contact the REC office immediately.

5.Amendments and Changes. If you wish to amend or change any aspect of your research (such as research design, interventions or procedures, participant population, informed consent document, instruments, surveys or recruiting material), you must submit the amendment to the REC for review using the current Amendment Form. You **may not initiate** any amendments or changes to your research without first obtaining written REC review and approval. The **only exception** is when it is necessary to eliminate apparent immediate hazards to participants and the REC should be immediately informed of this necessity.

6.Adverse or Unanticipated Events. Any serious adverse events, participant complaints, and all unanticipated problems that involve risks to participants or others, as well as any research-related injuries, occurring at this institution or at other performance sites must be reported to Malene Fouche within **five (5) days** of discovery of the incident. You must also report any instances of serious or continuing problems, or non-compliance with the RECs requirements for protecting human research participants. The only exception to this policy is that the death of a research participant must be reported in accordance with the Stellenbosch University Research Ethics Committee Standard Operating Procedures. All reportable events should be submitted to the REC using the Serious Adverse Event Report Form.

7.Research Record Keeping. You must keep the following research-related records, at a minimum, in a secure location for a minimum of five years: the REC approved research proposal and all amendments; all informed consent documents; recruiting materials; continuing review reports; adverse or unanticipated events; and all correspondence from the REC

8.Provision of Counselling or emergency support. When a dedicated counsellor or psychologist provides support to a participant without prior REC review and approval, to the extent permitted by law, such activities will not be recognised as research nor the data used in support of research. Such cases should be indicated in the progress report or final report.

9.Final reports. When you have completed (no further participant enrollment, interactions or interventions) or stopped work on your research, you must submit a Final Report to the REC.

10.On-Site Evaluations, Inspections, or Audits. If you are notified that your research will be reviewed or audited by the sponsor or any other external agency or any internal group, you must inform the REC immediately of the impending audit/evaluation.

APPENDIX B

UNIVERSITEIT·STELLENBOSCH·UNIVERSITY
jou kennisvennoot • your knowledge partner

STELLENBOSCH UNIVERSITY

CONSENT TO PARTICIPATE IN RESEARCH

EXPLORING CHRONOTYPE, CONSCIENTIOUSNESS, WORKPLACE FLEXIBILITY AND WORK OVERLOAD WITHIN THE JOB DEMANDS–RESOURCES MODEL.

You are asked to participate in a research study conducted by Tanya Meyer, from the Industrial Psychology Department at Stellenbosch University. The results obtained will contribute to the completion of a Master of Commerce degree in Industrial Psychology. You were selected as a possible participant in this study because you are generally considered a knowledge worker, that is, you are currently employed and your basic work task is that of thinking and predominantly involves working with information (in one form or another) and does not include or minimally involves work that requires strength, physical skills nor consists predominantly of manual labour.

PURPOSE OF THE STUDY

Striving to achieve a competitive advantage is crucial for modern organisations and knowledge workers have a vital role to play. Two elements of employee well-being that can assist in the attainment of a competitive advantage for organisations are low burnout levels and high work engagement levels. Given the above, the research sets out to investigate the effects of certain factors associated with burnout and work engagement namely chronotype (i.e your preference for when you are awake and asleep), conscientiousness (responsibility and reliability), workplace flexibility and work overload in order to determine their effects on the burnout and work engagement levels of knowledge workers.

1. PROCEDURE

If you volunteer to participate in this study, you will be asked to complete a short 20-minute survey wherein you will be analysing yourself in terms of your preference for time of day as well as your level of burnout, work engagement, conscientiousness, work overload and workplace flexibility. There are no right or wrong responses; we are merely interested in your self-assessment. The survey will be web-based and you are free to complete it at a time and location that are convenient to you.

2. POTENTIAL RISKS AND DISCOMFORTS

The survey poses a minmal risk that you might experience some discomfort due to your sacrifice of time when responding to the items in the survey. We highly appreciate your time devoted to answering the survey.

3. POTENTIAL BENEFITS TO SUBJECTS AND/OR TO SOCIETY

Participation in this study has no direct benefit to you as an individual participant; however, there is a societal benefit from this research as it will contribute to the body of scientific knowledge and equip organisations to better manage their employees and their associated well-being.

4. PAYMENT FOR PARTICIPATION

No payment will be made to participants for taking part in this study.

5. CONFIDENTIALITY

No information will be collected from participants that could identify them. Participation in this study will be completely anonymous. The results of this study will be published in the form of a completed dissertation and potentially in an accredited journal, but no identifying information will be asked of participants who consequently remain completely anonymous.

6. PARTICIPATION AND WITHDRAWAL

You can choose whether to be in this study or not. If you volunteer to be in this study, you may withdraw at any time without consequences of any kind. If you choose to not participate before ticking the tickbox to give consent, your information will not be captured in the data set. If you have already agreed to participate in the study and you would like to end your participation, you can witdraw by simply closing the browser window before saving and the information will not be captured in the data set. You may also refuse to answer any questions you don't want to answer and still remain in the study. The researcher may withdraw you from this research if circumstances arise which warrant doing so.

7. IDENTIFICATION OF INVESTIGATORS

If you have any questions or concerns about the research, please feel free to contact the researcher Tanya Meyer (084 359 2851; tanyameyer1990@gmail.com) or the research supervisor, Mrs. M. Boonzaier (0218082556; mib@sun.ac.za).

8. RIGHTS OF RESEARCH SUBJECTS

You may withdraw your consent at any time and discontinue participation without penalty. You are not waiving any legal claims, rights or remedies because of your participation in this research study. If you have questions regarding your rights as a research subject, contact Ms Maléne Fouché [mfouche@sun.ac.za; 021 808 4622] at the Division for Research Development, Stellenbosch University.

CONSENT FORM (please tick the appropriate box):

I hereby consent to voluntarily participate in this study. ☐

I don't want to participate in this study. ☐